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# Notes on British Socialism

A year ago last winter British industry was forced to slow down because power supply was not meeting demand. The press again carries accounts of partial paralysis resulting from significant power failure. England apparently does not have the facilities or the fuel necessary to provide the country with the power to operate industrial plants and meet normal consumer needs.

This is rather disturbing to Americans who made an initial postwar grant of $3 3/4 billion to the British and more recently provided for their liberal participation in a $6 billion ERP fund. They have noted reports of industrial production substantially exceeding prewar levels, of coal output targets reached and exceeded, of general confidence by present British leadership in the high productivity of socialism.

It is hard to reconcile the foregoing with industrial infirmity, chronic dollar shortages, austere living standards which show no signs of improvement, and the resort by the Exchequer to a drastic capital levy. The published official statistics and the optimistic utterances of government spokesmen suggest improvement; the reports of objective observers describe deterioration.

It is possible that the official figures noting progress are selective and slanted. Apparently some of the coal tonnage which accounts for the bright reports is stone and slate with negligible Btu. A public employer-- at least in the early stages of collectivization-- cannot be too tough with workers who keep the employer in power. The alleged increase in British industrial production is officially described as 10% above 1938. That happens to have been a low prewar year. If 1937 is taken as the base, production today is barely 2% higher. Since there are a million more workers in Britain today than in 1937, this means that the average worker is producing 13% less than he did before the war.

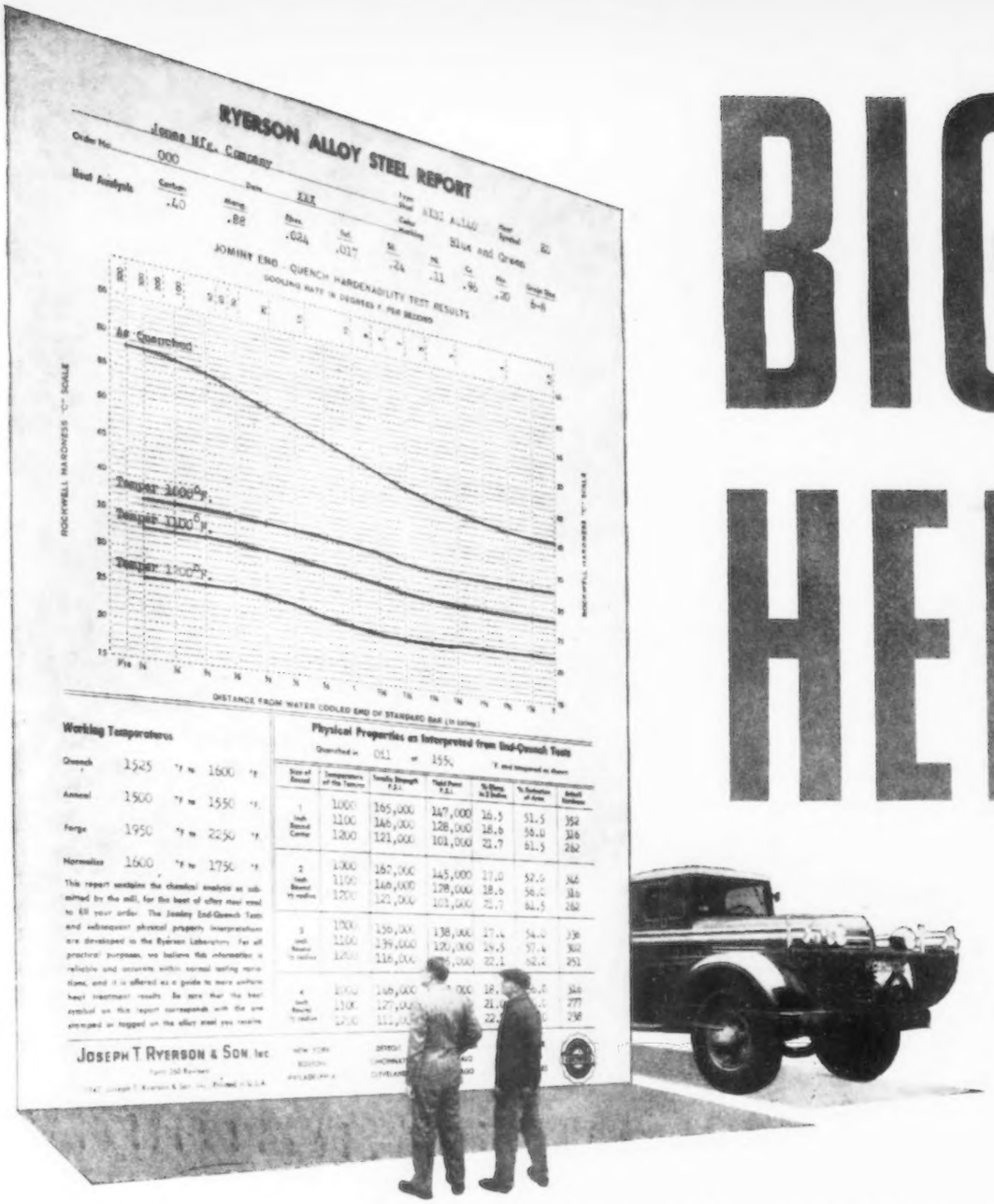
Living standards and material progress consist not of ideological dogma and party enthusiasm but of tangible products and visible service. The latter build up the great national heap which, when redistributed, spells out more food, clothing, shelter and leisure. No amount of fervid exhortation or socialist zeal can take the place of loaded coal cars, bins of grain or bolts of cloth. Yet socialism apparently is striving to realize precisely this miracle of having more by producing less.

Socialism, unless it traverses the whole space between democratic capitalism and totalitarian communism, which many careful students believe to be inevitable once socialization begins, forfeits the essential discipline and the powerful incentives without which greater production is impossible.

It may well be that a vested interest in personal power prevents the present British leadership from acknowledging the plain facts of failure, admitting the obvious diagnosis, and proceeding with the indicated remedy. To do so would forfeit position. In the conflict between personal interest and palpable truth, it is the former that still prevails.

In this the leaders of the British Labor Party are perhaps no different than other mortals. On the other hand, America is underwriting in part the consequences of socialist failure. It will be well for us to note the fact as we evolve our own policies.

*Joseph Stagg Lawrence*

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► Skin milling is being attempted on the wing covering of jet aircraft. A complete revision of thinking concerning wing covering has been necessitated by the high speeds obtained by these craft. Currently, a couple of newly developed skin milling machines are in operation and orders for several more are in the process of being placed. The wing surface is milled to the shape of the wing and the wing is built up in sections.

► Plans have been submitted by Colvilles Ltd., Scottish iron and steel manufacturers, for large extensions to several of their works. Authority has been received to build new coke ovens at Clyde Iron Works, while additional melting plant at Clydebridge and extensive additions to the plant at Dalzell and Lanarkshire works are planned.

► A recent application of aluminum bronzes is for pickling barrels used by electro platers to clean parts. The barrels are made by welding the sheet bronze into an inner liner. Life of these barrels is reported to be much better than those formerly used.

► A new, single finish coated vitreous enameled sheet will be marketed about the end of the year. The new sheets, the result of many years of research in porcelain enameling, are expected to expand applications for this type of material on the basis of tests made to date.

► Import permits amounting to $1,600,000 have been granted by the Turkish Government for the purchase of 10,000 tons of concrete reinforcing bars and wire rods from Belgium, on condition that Belgian suppliers provide a 2 pct ad valorem guarantee that delivery dates will be adhered to. Most Belgian exporters have agreed to this clause. Deliveries will be made this Summer.

► Pipe producers hope to take most of the future gas holder business. Aside from the disadvantages they ascribe to the conventional gas holder--unsightliness and the air traffic hazard--they estimate that the older type system costs 3 to 5 times as much to install as high pressure underground storage in random lengths of large diameter high carbon seamless steel tubing.

► Because of the revitalized aircraft program, some warehouses are again considering the stocking of aircraft quality alloy steels. Billets, bars, and cold drawn bars are the items involved.

► CDT Director J. Monroe Johnson thinks that railway freight car production should be stepped up to 14,000 cars per month starting in July and that it should hit 16,000 cars per month by next January. This would surely help the industry reach the present 10,000-car production goal, which, so far, has proven to be extremely elusive.

► Worried steel makers still have one eye on the ingot rate and the other on John L. Lewis. They know that the extent to which coal miners can live on credit today vitally effects the length of a potential coal strike. Reason most frequently given by those who say there will be no coal strike is that the whole thing will be settled between John and the Judge.

► It is now established that better wear resisting properties in hard facing applications are secured if the hard alloy is deposited by using a gas flame rather than an arc. Better metal dilutions, or alloying of the two materials, is reported when gas deposition is used.

► Excellent results are claimed for a powder heat-treating method used for hardening steel. The powder is applied to the steel and then it is heated. One source claims that an ordinary nail, so processed, can be driven through sheet steel without damaging the point.

► Battle-against-inflation gestures by British industrialists include a special discount to home trade customers of 2½ pct announced by Stewarts & Lloyds, tube manufacturers. The discount applies to about 90 pct of the steel tubes manufactured by the company. Imperial Chemical Industries, Ltd., has reduced prices over a wide range of its products. The saving to customers will amount to more than $4 million during the next 12 months.

► Drilling of automotive crankshafts, using a step-drilling technique, has resulted in more accurate holes and higher production. One large motor car company, using step-drilling in a transfer-type production line, drills some 28 holes of varying depth and diameter, getting 60 completed crankshafts in an hour.

*The Practical Application of*

# Hardenability Specifications

***With the steel user urging closer control over hardenability and the steelmaker finding it increasingly difficult to meet chemical analysis specifications, it appears that there is much to be said, both metallurgically and economically, in favor of purchasing alloy steels under controlled hardenability specifications. Data are presented in this article indicatng the practical significance of minimum hardenability in regulating physical properties, and also the relation of minimum hardenability to percent of martensite. The author also discusses the effect of tempering on hardenability and points to the desirability of performing the measurement of this relationship in the hardenability test specimens.***

By H. B. KNOWLTON

*Supervisor of Materials Engineering,*
*International Harvester Co.,*
*Chicago*

THE superior performance of the automotive alloy steels depends upon the high degree of strength and toughness produced by heat treatment. Accurate control of the final properties depends upon the selection of the steel and the details of the heat treatment.

For many years alloy steels have been purchased under specifications for chemical composition. Closer and closer limits have been imposed until it has become difficult for the steelmaker to produce a material with six hardening elements all within the specified limits. At the same time it is entirely possible that a heat of steel will fail to harden properly because all of the hardening elements are at the bottom of the specified range.

Several years before the war it was realized that a new yardstick was needed for the measure of the hardenability or response of steel to heat treatment. This term should not be confused with hardness. The maximum hardness that can be produced with an ideal quench depends entirely upon the carbon content of the steel, as shown by the curve for the hardness of 100 pct martensite, in fig. 1 (Burns, Moore and Archer)[1], while the ease or difficulty of producing full martensite depends upon the hardenability of the steel. The higher the hardenability the less drastic is the quench required to produce a hardness.

The initial cross-sectional hardness produced on a certain size part by a definite quenching treatment can be predicted from the hardenability of the steel and the speed of cooling at different points on the cross-section. After tempering, the hardness of both the surface and the cross-section will be reduced, and, in general, there will be less difference between the hardness of the surface and the center. The final hardness depends upon the initial or as-quenched hardness, the time and temperature of tempering, and the type and amount of carbon and alloy in the steel.

The importance of final cross-sectional hardness cannot be over emphasized, since the other physical properties, such as strength and toughness, are either directly proportional to the cross-sectional hardness after tempering, or are dependent to a large degree upon cross-sectional hardness after tempering and the hardenability or cross-sectional hardness before tempering.

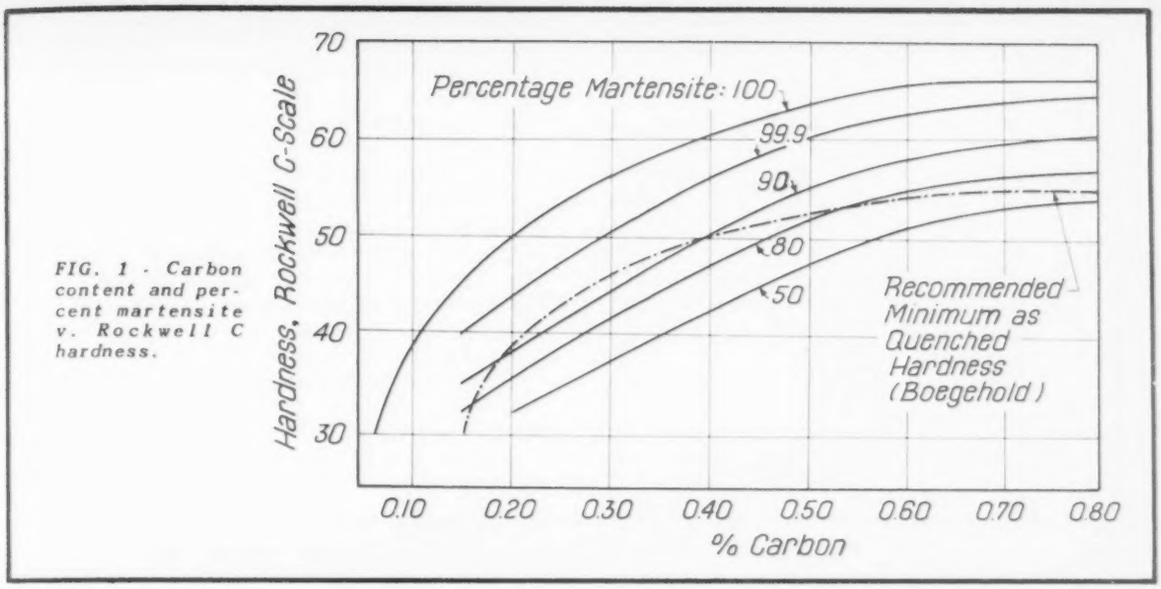



*FIG. 1 - Carbon content and percent martensite v. Rockwell C hardness.*

The tensile strength at any location on the cross-section is directly proportional to the hardness at that point. The ratio of yield strength to tensile strength varies from about 50 to 90 pct depending upon whether the steel is annealed or fully hardened and tempered. In general, ductility and impact strength are inclined to be somewhat inversely proportional to tensile strength and hardness. Crafts and Lamont[2] have shown, however, that for any given hardness the ratio of impact strength to tensile strength is highest when the steel is fully martensitic before tempering. This will be more fully discussed later.

Another important factor which is only beginning to be appreciated is the presence of residual stresses produced in all commercial steel parts by heat treatment. These stresses are due to the fact that the entire cross-section of the piece does not pass through the hardening transformations, with consequent expansion and contraction, at the same time. Type and magnitude of stresses depend upon the rate at which hardening transformations take place, and this again depends upon the hardenability of the steel.

While hardenability specifications are not to be considered as a panacea, it is probably true that hardenability is the most important single property for predicting final physical properties and useful performance of a finished part. The hardenability will also give valuable information concerning the properties to be expected after hot rolling, normalizing, welding, and other operations.

Several years ago a joint committee representing the AISI and SAE made a survey of all of the existing data concerning hardenability of steels which had been used up to that time. A large number of producers and users submitted data for this study, the results of which were covered by two reports[3]. None of the heats studied were produced under hardenability specifications; they represented what might be expected from heats made on a commercial basis to specifications for chemical composition.

A number of interesting points were brought out by this data. Fig. 2 shows the hardenability curves representing the maximum and minimum observed hardenability from 147 tests on NE

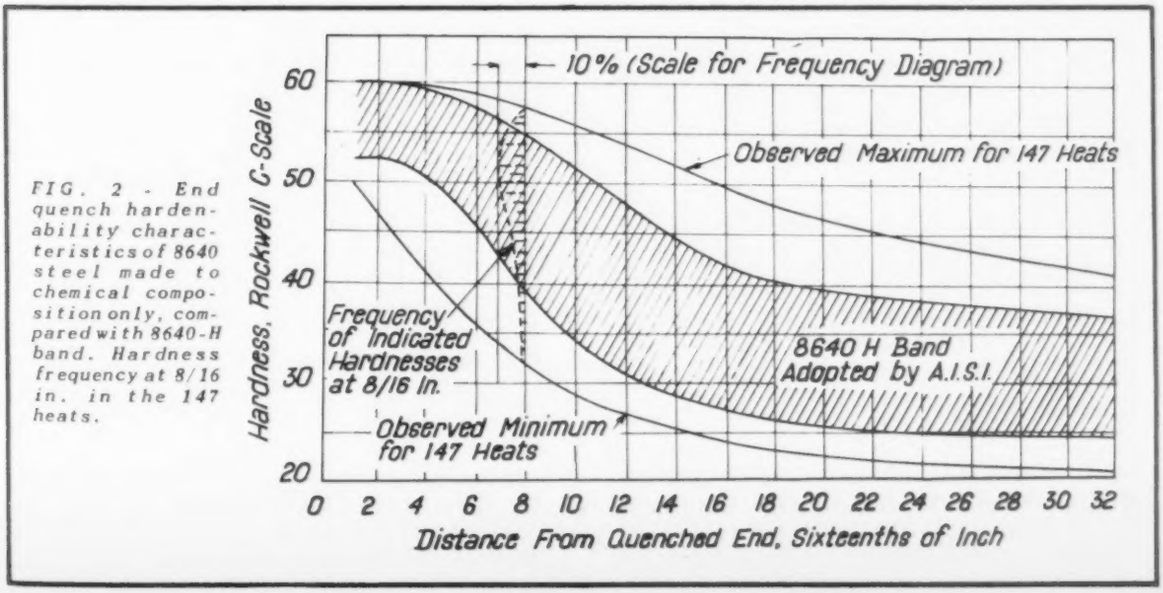



*FIG. 2 - End quench hardenability characteristics of 8640 steel made to chemical composition only, compared with 8640-H band. Hardness frequency at 8/16 in. in the 147 heats.*

8640 steel. These curves represent hardness readings at different points on the Jominy specimen; consequently, they represent the hardness that would be expected with the different quenching speeds for each of the steels studied.

The hardness is plotted vertically, while the distance from the quenched end of the Jominy specimen (and consequently the quenching speed), is plotted horizontally. Between the maximum and minimum observed curves is a wide band within which fall the experimental data from the 147 tests. This band is much wider than was anticipated. It was hard to believe that such a wide variation in the hardenability of any steel purchased under a single specification existed. This was not a peculiar property of 8640 steel; the broad band is representative of nearly all the alloy steels studied.

Prior to this investigation, Grossmann had proposed some mathematical formulas for calculating hardenability from chemical composition and grain size. These formulas were based on a statistical study of data from a large number of heats. It was found that the minimum hardenability *calculated* on the basis of Grossmann's formulas was almost identical with that of the *observed* minimum hardenability. Subsequently Field[4], and later, Crofts and Lamont[5], devised methods for calculating the entire hardenability curve from chemical composition and grain size. The minimum curves calculated on this basis agree fairly well with the observed minimum curves. Later tests have also proved that the minimum hardenability curve is fairly accurate. On the other hand, Grossmann's calculations would indicate a possibility of obtaining an occational heat of a hardenability even higher than that of the observed maximum curve.

Frequency curves were also plotted to show the distribution of high and low hardenability heats within each type of steel. An example of this is shown in fig. 3, in which hardenability is represented by the distance from the end face of the Jominy specimen to the point at which 50 Rc appears. The distance (in 1 16 in.) to 50 Rc is plotted horizontally, while the number of heats for each degree of hardenability is plotted vertically.

A number of important conclusions can be drawn from these studies:

The hardenability band for any given type of steel, 4140 or 8640, for example, is much wider than was generally thought. This means that the as-quenched, cross-sectional hardness of commercial parts made of any given alloy steel shows more variation than commonly supposed. This variation in hardness is reduced somewhat by tempering; the higher the tempering temperatures, the less will be the spread in the results. Nevertheless there is probably a greater variation in the final center hardness of pieces made from a given type of steel than has been realized.

The minimum hardenability for any given type of steel is also lower than generally realized.

Comparison of the hardenability bands and frequency curves for different types of steel showed a much wider difference between the maximum and the minimum hardenability of a single type of steel than between the average hardenabilities of different steels, (4140 and 8640, for example).

The frequency curves also showed that a study of at least 50 heats of steel is necessary in order to determine even approximately the maximum and minimum hardenability that may be expected with any specified analysis range.

In spite of this, many metallurgists have, in the past, formed opinions about a new type of steel on the basis of the performance of a relatively small number of heats. The curves would indicate that probable minimum properties can be estimated more accurately by calculating the minimum hardenability in accordance with Grossmann's formulas than by depending upon tests of even 15 or 20 heats of steel. Fortunately, the former method was used in working out the composition of the NE steels. One is too prone to think of a *family* of steels carrying a single specification number as being a *single entity*.

## Correlating Minimum Hardenability With Physical Properties

Success or failure in service depends upon the minimum physical properties; if the minimum fatigue endurance limit is above the stress to be encountered in service, there will be no fatigue failures. For relatively unimportant parts, which are easily replaced, service failures of 2 or 3 pct may be tolerated. In fact, some easily replaceable parts may even be used as fuses to prevent the breakage of more vital parts under abusive handling. On the other hand, a small fraction of 1 pct failure of vital parts, such as connecting rods and crankshafts, would be very serious.

Much of the published data on properties of steel has not been of maximum engineering value because it was based upon comparison of average properties of different types of steel. The minimum properties might, or might not, be proportional to average properties.

One of the principal advantages of hardenability bands is that they show the minimum hardenability that may be expected with different types of steel. From this can be calculated the minimum surface and cross-sectional hardness which may be expected with a given diameter and a given type of quench. As will be discussed later, surface and cross-sectional hardness, after tempering, depends at least in part upon the hardness produced by quenching. Other physical properties are somewhat proportional to cross-sectional hardness.

Fig. 3 shows that the minimum hardenabilities reported on a number of alloy steels made from chemical analysis specifications were considerably lower than most metallurgists expected. However, these figures were obtained upon heats of steel which were actually purchased and used. It is more than likely that if 2 or 3 pct of the parts produced from these heats fail to meet the specified hardness, after being given the production heat treatment, the steel specifications would be changed and higher hardenability steels would have been ordered. Even a smaller percent of field failures would undoubtedly have brought about a change in steel specifications or perhaps, in design. Continued use would indicate that there was not a prohibitive percent of trouble either in processing or in service. This would

lead to the idea that the minimum hardenability actually necessary would be that represented by an elimination of 2 or 3 pct of the heats having the lowest hardenability.

The frequency curve for 4340 steel is of particular interest in this regard. Over 70 pct of the heats showed a hardenability of J50 over 32 (1/16ths), and yet a rejection of only 3 pct of the heats as being possible troublemakers, would set a minimum hardenability at J50 equals 14 (1/16ths). In other words, it seems quite likely that any of the 4340 heats, which had a hardenability over J50 equals 14, gave satisfactory performance both through processing and in service. Considering the fact that none of these heats were made on a hardenability basis, it does not seem likely that the high and low hardenability heats were scheduled for different applications on the basis of their hardenability. This leads to the thought that perhaps a steel with a lower average hardenability, but still having a minimum of J50 equals 14, might also be satisfactory.

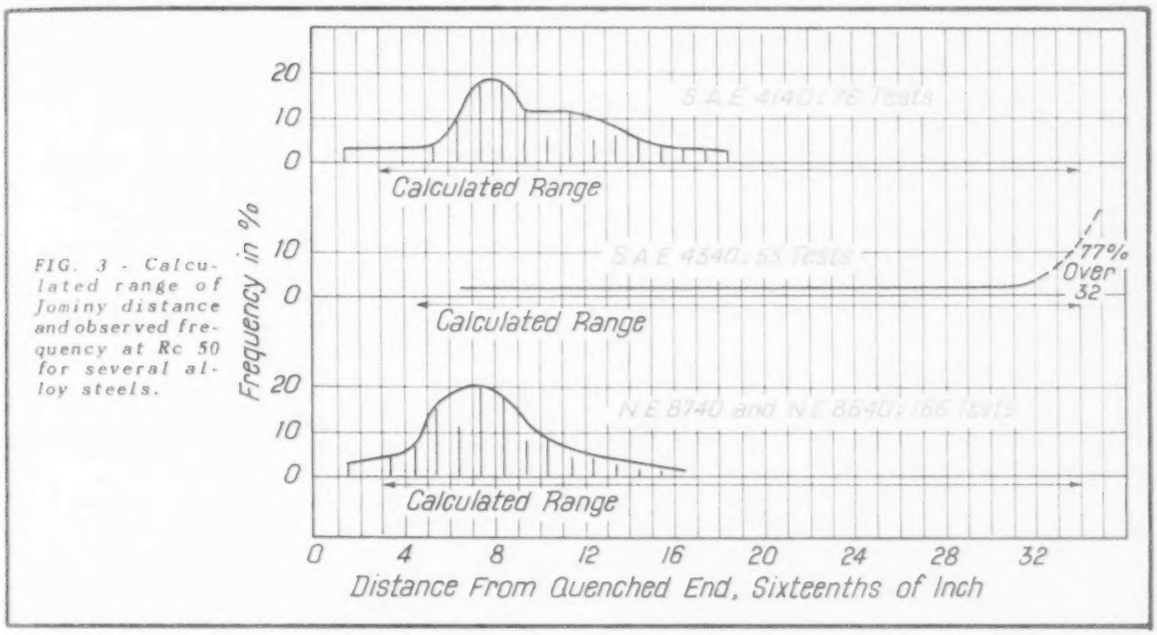



*FIG. 3 - Calculated range of Jominy distance and observed frequency at Rc 50 for several alloy steels.*

## Minimum Hardenability v. Percent Martensite

There have been a number of attempts to establish a figure which represents the most desirable percent of as-quenched martensite. It is unfortunate that the term ideal has been applied to a condition of 50 pct martensite in the center, since there are probably few applications where 50 pct martensite (in the center of the piece) is the most desirable structure.

It has already been stated that the highest yield:tensile and impact:tensile ratios can only be obtained when the heat treatment produces 100 pct martensite before tempering. It would seem desirable, therefore, to select steels which have sufficient hardenability to guarantee full hardening, or 100 pct martensite, before tempering. Actually, to do this would, in many instances, mean using higher alloy steels than those which have been proven satisfactory by actual service.

For example, in fig. 1, Burns, Moore, and Archer[1] show the Rockwell hardness corresponding to 100 pct martensite for steels of different carbon content. This is independent of alloy content, which governs the quenching speed necessary to attain the hardness.

The minimum permissible carbon content for 8640 steel is 0.36 pct. The hardness for a 100 pct martensite steel containing 0.36 pct C is about 58 Rc according to Burns, Moore, and Archer. It will be noted in fig. 2 that the minimum expected hardness for 8640 steel at the 1/16-in. Jominy distance is Rc 50 when the steel is specified by chemical composition only, and Rc 52.5 when the 8640-H is specified. The cooling speed at the 1/16-in. point corresponds approximately to that of the surface of an oil-quenched 3/8 to 1/2 in. diam round. It follows then, that if 100 pct martensite on the surface is the criterion for the selection of steel, 8640 should not be specified for oil-quenched parts 1/2 in. or over in diam. Actually, much larger parts made of 8640 have given satisfactory performance.

Consequently, some metallurgists have proposed the use of other percentages of martensite as a more practicable criterion for the selection of steel. Fig. 1 shows curves for 100, 99.9, 99, 80 and 50 pct martensite, as well as a minimum hardness curve recommended by Boegehold (data from Hodge and Orehoski[6], and Boegehold[7]). The 90 pct martensite and the Boegehold curves would require a minimum as-quenched hardness of about 48 Rc. According to the 8640-H band and Boegehold's cooling rate curves, a minimum quenching speed of 50°F per sec would be required to produce this hardness with a minimum hardenability lot of 8640-H steel. This would correspond with the surface of a 2 1/4-in. round or the center of a 15/16-in. round oil-quenched bar. The fact that 8640 steel has been successfully used for many parts which are larger than 1 in. diam, and are oil-quenched, would indicate that 90 pct martensite in the center is not an essential requirement for such applications.

Maximum hardenability beyond all doubt is an

important factor in cracking. However, the many other complex factors involved in quenching parts has made it impossible so far to determine precisely the exact role played by high hardenability alone. Uneven heat gradients, changes in mass of a part plus variables in day-to-day technique all affect the end product. Further study is at present being made in the effort to better correlate high hardenability with cracking, distortion and similar troubles.

There is also some relation between maximum hardenability and maximum hardness obtained after tempering. As will be explained later, there are other factors involved in producing the hardness after tempering. Nevertheless, it would be desirable to hold the maximum hardenability as low as practicable.

## Hardenability Bands

Simultaneously with the work of the SAE-AISI hardenability data committee, the alloy bar committee of the AISI made an independent study of a number of alloy steels and proposed a new scheme of specifying both chemical analysis and hardenability. These hardenability specifications have been adopted by both the AISI and the SAE, and may be used as an optional method of ordering alloy steel. The same code numbers are used for these alloy steels, but with a suffix H which indicates that they are produced under the hardenability specifications.

It was hoped that the new hardenability specifications would be of benefit to both producer and user. The chemical analysis specifications for the H steels allow a slightly wider range of composition so far as individual elements are concerned. However, a closer control of the *total* composition of hardening elements is necessary in order to produce hardenability within the specified H band. Consequently, the user actually obtains a steel with a narrower spread of properties than it is possible to obtain under the old specifications covering chemical analysis only.

Fig. 2 shows a comparison between the present H band for 8640-H steel and the experience band based on 147 heats of 8640 steel purchased according to chemical analysis. The wider band represents the actual observed hardenability of steel made to the standard chemical analysis range. The shaded band in the center represents the range of hardenability under which 8640-H steel may be purchased.

Fig. 2 also shows a frequency curve for hardenability of the 147 heats based on chemical analysis. This frequency is plotted in terms of number of heats for each different degree of Rockwell hardness at 8/16ths in. from the quenched end of the Jominy specimen. This corresponds to the surface hardness of an oil-quenched 3-in. round, or the center hardness of an oil-quenched 1⅜-in. round. It will be noted that about 3 or 4 pct of the heats on the low side and a similar amount on the high side, would have been eliminated if the steel had been purchased under the H bands. This should be desirable from the user's standpoint because it would definitely eliminate the small percent of heats which might fail to attain satisfactory hardness in production heat treating, or might fail in the field due to lack of hardenability. It would also eliminate a small percent of the heats which are on the high side of hardenability.

The H band specifications are slowly coming into use. The International Harvester Co. was first to adopt H specifications for 8600 steels, and experience has shown a decided advantage for the use of these specifications. At the present time most alloy steels can be purchased either under the H bands or under chemical analysis specifications, or some combination of the two.

Some are inclined to feel that the use of the minimum hardenability of the H band and the narrower analysis range of the old standard specifications would give the closest control of hardenability. This is not the case as is shown by the following example, which shows the range of hardness that would be obtained at 8/16th in. from the quenched-end on the Jominy specimen, or would be expected on the surface of an oil-quenched 3-in. round or the center of a 1⅜-in. round specimen.

| Method of Specifying Steel | RC. (8/16 in. on Jominy) Min. | Max. |
|---|---|---|
| (1) 8640 chemical analysis | 32 | 58 |
| (2) Standard chemical analysis plus hardenability corresponding to H band (min) | 39 | 58 |
| (3) 8640-H hardenability | 39 | 55 |

It is too early to make an accurate appraisal of the value of H band specifications. While the number of companies using these specifications is slowly increasing, there has not been much data disseminated as to how the specifications are working out. A number of cases have been reported where the use of H band specifications has eliminated a small percent of heats of steel which would otherwise have given trouble due to insufficient hardenability.

Some steel fabricators feel that the use of these specifications has brought about a decrease in the amount of trouble with distortion and cracking due to too high hardenability; others have not noted any particular difference in this respect. It must be remembered, however, that the purchase of alloy steel on a chemical analysis basis was probably satisfactory in at least 97 pct of the cases. Consequently, only a small percent of improvement could be expected with any new method of ordering. The author has not heard of any cases where steels purchased under hardenability specifications have given trouble which would not have been experienced had the steels been purchased under the chemical analysis specifications.

## Demand for Closer Control of Hardenability

There is a very urgent demand on the part of many steel-using metallurgists for a closer control over hardenability. This is not due to the need for eliminating insufficient hardening, or trouble with cracking and distortion, as it is to the desire to maintain final hardness within specified limits with fewer changes in the tempering temperature. A minimum hardenability is necessary in order to produce the minimum physical properties required to guarantee satisfactory service performance. The narrower the

total range of hardenability above this minimum, the better, so far as a steel user is concerned. On the other hand, there are practical limitations for the steel producer, and if the maintenance of a narrow hardenability range causes a large number of heats to be rejected, the cost of steelmaking will be increased.

Nevertheless it is believed that the steel user is right in wishing to have as narrow a range of hardenability as practicable without increased cost. At least one large user of steel has found it possible to obtain a closer control of hardenability by applying high and low hardenability heats to different types of parts. This can be done if the ratio of high and low hardenability applications is the same as the ratio of high and low hardenability heats, which will appear in normal production. It would not be possible, however, to produce all heats to the high side of the present hardenability bands without rejecting a large number of heats.

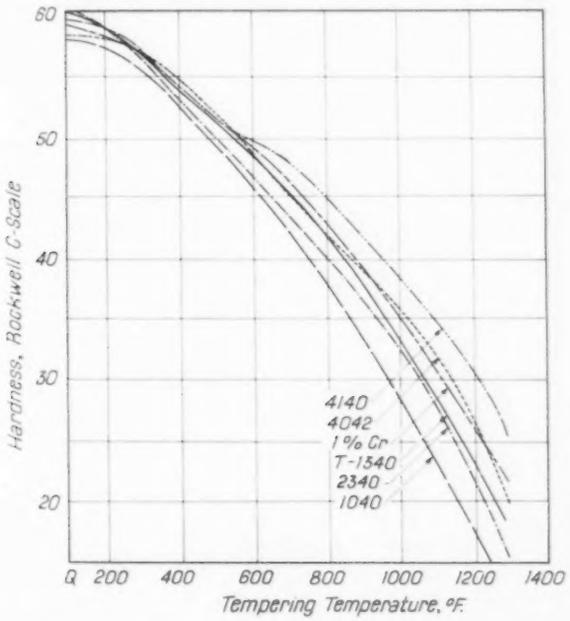



*FIG. 4 - Effect of tempering on hardness of quenched 0.40 to 0.45 pct C steels (Bain)[8].*

As has already been stated, hardenability tests may be used for predicting the as-quenched hardness on the surface or over the cross-section of various size bars of steel if the speed of quenching is known. Hardenability, however, is not the only factor that governs the final hardness produced by quenching and tempering; chemical composition of the steel has an effect upon the rate of tempering.

Fig. 4 shows the relative effect of tempering upon several steels of different chemical compositions. From these curves it is obvious that even if the as-quenched hardness is controlled accurately by the hardenability specifications, it is still possible for there to be a difference in the final cross-sectional hardness produced by hardening and tempering. This is one of the reasons why it is not desirable to specify steel on the basis of hardenability alone. However, hardenability plus a general type of alloy present may prove to be an adequate specification.

Along this line, mention should be made of work done by Crafts and Lamont[9] on calculating hardness, after tempering, from chemical composition.

It would seem obvious from the foregoing discussion that the next logical step would be the measurement of effect of tempering upon the Jominy hardenability specimens themselves. Very little work seems to have been done along this line by metallurgists concerned with production control in fabrication of steel parts, although a large warehouse company has made a practice of recording not only the Jominy hardenability of each heat of alloy steel, but also the results of tempering the Jominy specimens at several different temperatures. They have reported that this has been very helpful in selecting steels that are required to meet certain specified hardnesses after quenching and tempering.

One advantage of the use of tempered Jominy specimens is that it is possible to predict the effect of tempering upon pieces which do not attain full hardness on quenching. As this is the usual rather than unusual condition in commercial practice, the tempered Jominy may give more valuable information than the common tempering curves which are based on 90 to 100 pct martensite before the draw.

There is a great need for further study of the effect of tempering. In the case of the low alloy automotive steels, the hardness decreases as the tempering temperature increases. Some of the higher alloy steels may show an increase of hardness when tempered at certain temperatures. With any given type of low alloy steel, the amount of decrease of hardness at any given temperature depends upon the initial structure and hardness.

All types of martensite do not seem to temper at the same rate. Similarly, there is less reduction of hardness on tempering fine pearlite than bainite of approximately the same hardness. Consequently, it is difficult to construct a series of curves which are representative of the effect of tempering steel samples having different degrees of as-quenched hardness. In general, a series of samples representing different degrees of as-quenched hardness for a single low alloy steel will all be reduced in hardness by tempering to increasing temperatures. With a temperature only slightly below the critical range, the hardness of all the samples will be approximately the same.

Most of the published data is based on the effect of tempering upon samples that are 100 pct martensitic. On the other hand, the great majority of commercial parts made of medium carbon alloy steels are not 100 pct martensite, as quenched, and the effect of tempering will be different from that given for steels which are 100 pct martensitic.

## Limitations of Hardenability Tests

Thus far this article has dealt with the use of hardenability specifications to improve the uniformity of products already being made from alloy steels. As stated previously, hardenability has also been used as a basis for the selection of alternate steels, which will have the same response to heat treatment and will perform the

*(Continued on Page 177)*

# Diecastings in the '48 Packard

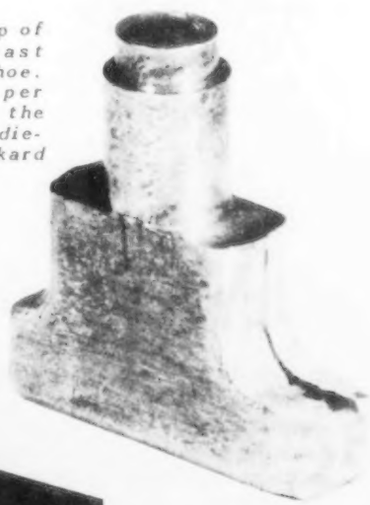
By HERBERT CHASE

WIDER use of diecastings in the 1948 models is reported by Packard engineers, including applications for parts classed as strictly mechanical. An especially noteworthy application is in hinged parts and brackets for convertible tops. These parts, five of which are shown in fig. 1, are sometimes subjected to abusive stresses, especially if assemblers attempt bending to compensate for some lack in alignment not a fault of the castings themselves. Partly on this account, the tendency heretofore has been to use malleable iron castings for such parts.

It has been found, however, that zinc diecastings require less machine work and polishing. There is, with diecasting, no chance of red rust and, for hinge joints, close fitting pins need not be bushed.

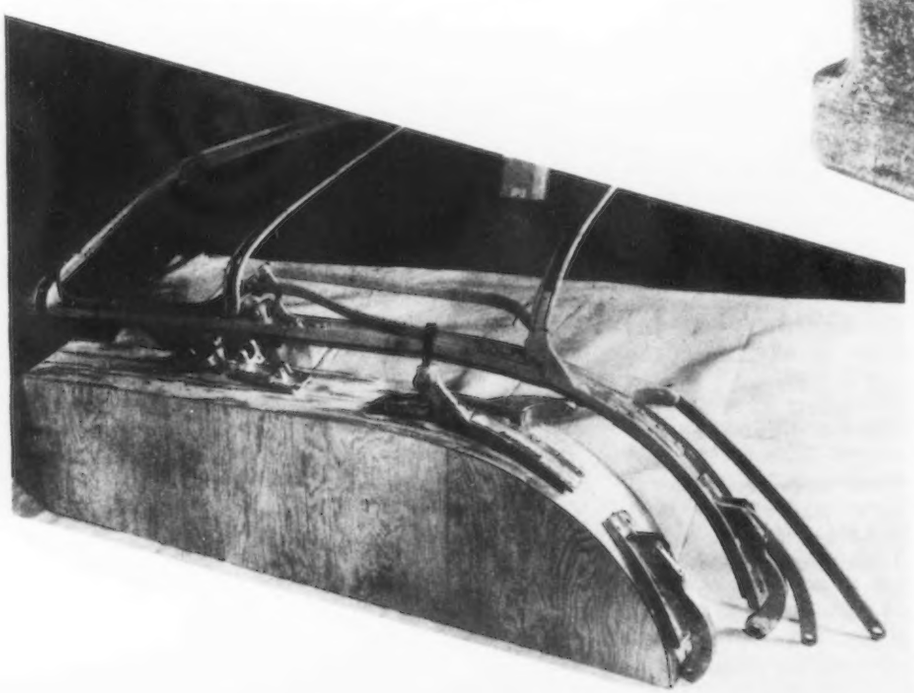
Diecastings have some advantage in weight over malleable iron castings of the same dimensions, according to Packard engineers, but their chief assets are adaptability, superior surface finish, close as-cast dimensions, overall economy and freedom from red rust. In some of the diecastings, where a slender projecting arm is needed, a steel insert is cast in place. This projection is subsequently riveted to a steel cross bow.

Other diecast mechanical parts included in



*RIGHT*

*FIG. 2 - Close-up of a bronze diecast shifter fork shoe. Four are used per car. These are the only copper-base diecastings in Packard cars.*



*LEFT*

*FIG. 1 - Section of top and bow construction in the 1948 Packard Super Eight convertible. Five zinc alloy diecastings, shown separately in the foreground, are used, as indicated on the near side of the assembled top section.*

***Significant in the design of the '48 Packard is the increased use of diecast parts, including several items having primarily mechanical functions. As many as 80 diecast parts, having a total weight of 61 lb, are used in some models. This article describes these castings and their use and comments on some of the considerations leading to the use of diecastings in preference to other fabricating techniques.***

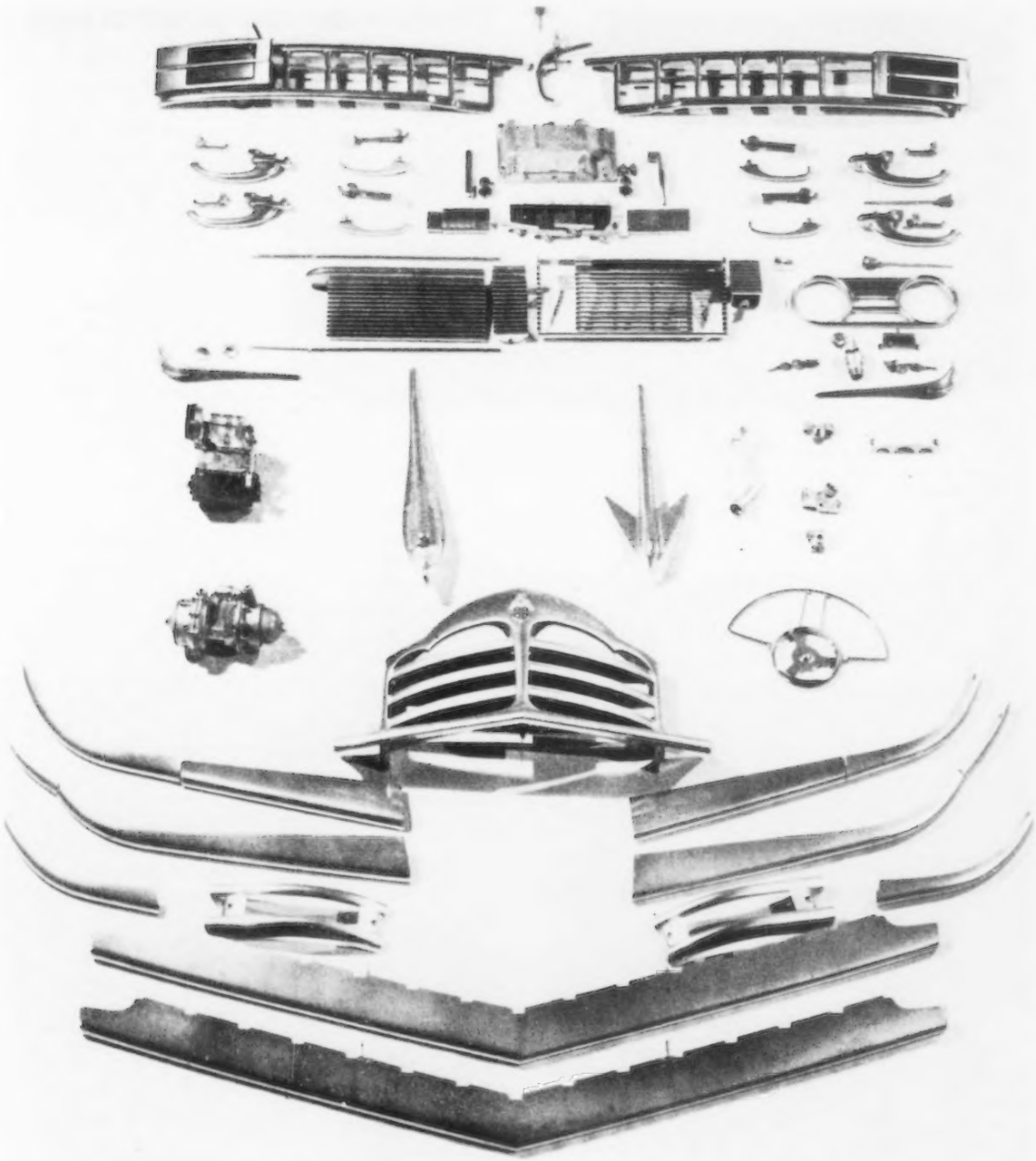
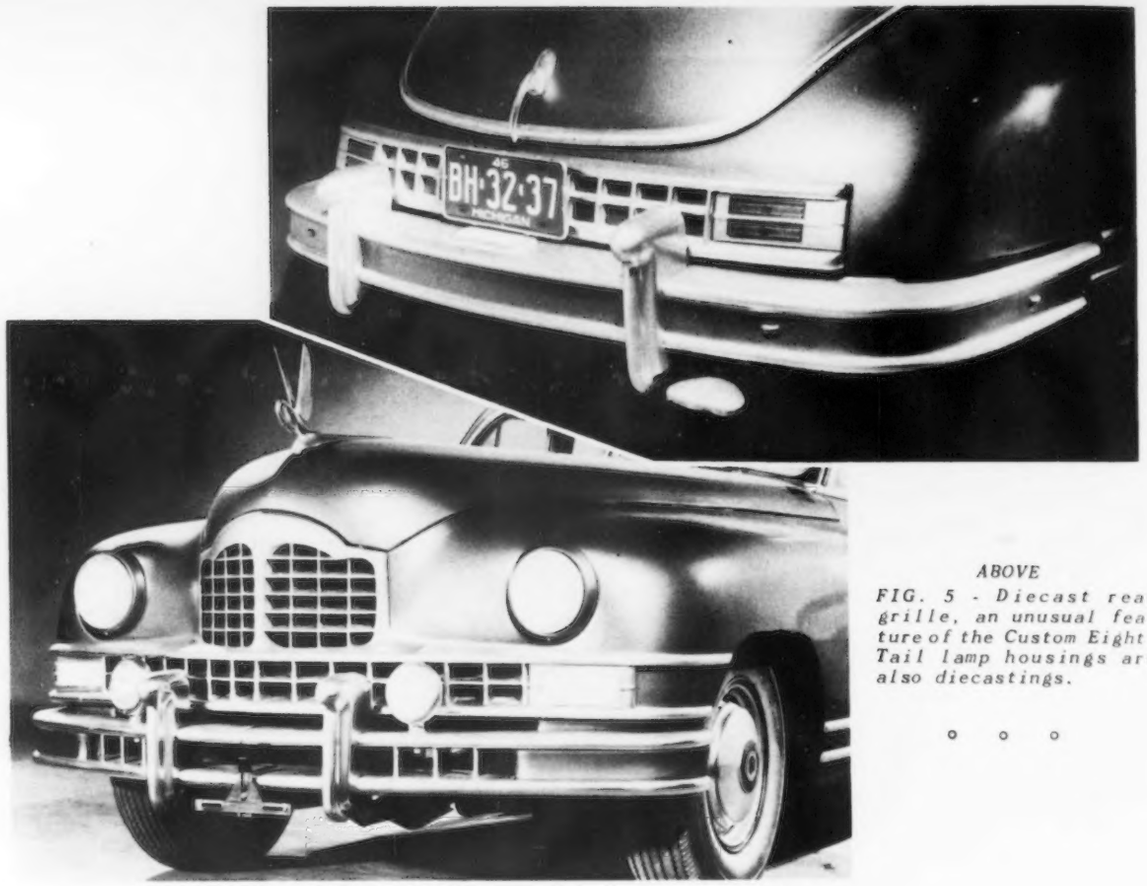


*FIG. 3 - All of these zinc-alloy diecastings are applied in one or another of the three 1948 Packard models. A typical four-door sedan has about 80 diecast parts of which the total weight is 60.72 lb.*




*ABOVE*

*FIG. 5 - Diecast rear grille, an unusual feature of the Custom Eight. Tail lamp housings are also diecastings.*

o o o

*FIG. 4 - Front end of 1948 Packard Custom Eight showing the cellular grille arrangement made from stainless stampings set into recesses of or between diecast components, all of which are polished and plated before assembly.*

Packard cars are a 3-lb transmission cover, a steering gear shift lever housing and bracket, a curburetor weighing 3.8 lb, a fuel pump weighing 1.8 lb, windshield wiper elements, a gear, housing and bracket for an air duct, several lock parts and a steering column bracket.

Fig. 2 shows a small bronze diecasting employed as shoes at the ends of shifter forks. The alloy used for this part runs 15.5 pct Zn and 3.75 to 4.75 pct Si, balance Cu. This alloy is chosen for high wear resistance and good bearing properties in contact with steel gear hubs. These are the only bronze diecastings used.

In a standard four-door Packard sedan, there are approximately 80 diecastings having a total weight of 60.72 lb. Of these, a large proportion is comprised of small parts weighing from a fraction of an ounce to about 1 lb. The weight of some of the larger mechanical parts was given previously. From fig. 3, which illustrates these diecast parts, it is apparent, however, that most of the total weight of diecastings is for components that perform combined structural and decorative functions. Not all diecastings in fig. 5 are used in all models, although the greater proportion is so applied.

Merely because the larger diecastings serve decorative functions, it should not be concluded that they are lacking in engineering interest. Much careful engineering was applied in their design and, in cases where it was not obvious that diecasting rather than some other method of construction was indicated, the diecasting was chosen only after careful analysis of both cost and serviceability had shown the casting to be the better alternative.

This applied, for example, to the two long flat bars at the bottom of fig. 5. These bars are portions of the radiator front assembly that goes below the grille proper. They could be made from stainless steel but analysis showed that, when assembly costs including welding and all other factors were considered, there was no balance of advantages over diecast construction and it was thought best to employ the diecast elements.

In the assembly there is, however, some effective use of stainless steel components, especially for the cellular structure that characterizes the front of the Custom Eight, as shown in fig. 4. This model has both vertical and horizontal partitions inside and between the diecast portions of the grille and, while the elements of each cell could be diecast, polishing inside the cells would be too difficult and expensive. So the diecasting is adapted to receive formed stainless elements. Bosses that facilitate the fastening of these elements are provided on the castings.

On the Super Eight, fig. 5, and DeLuxe Eight, several of the same diecast components used in the Custom Eight are employed in the radiator front assembly, but the grille has integrally cast horizontal bars only the front faces of which

require polishing, the recessed faces being left as cast except for painting over the recessed areas. These areas also receive whatever plating throws onto them when the grille as a whole is plated.

In the radiator front (grille) assembly, there are 13 zinc diecastings having a total weight of 25 lb. The heaviest of these parts, the central grille, weighs 7.5 lb and the two long bars 5.5 lb each. Most of the others weigh less than 1 lb each. In most of these and other larger castings, sections average about 3/32 in. thick, as this thickness appears to give the best combination of good structure, low porosity and smooth surfaces, the latter being of great importance in attaining a good finish at moderate cost.

Something new and distinctive is attained in the rear appearance of the Packard Custom Eight by applying a purely decorative grille, diecast in two halves, just above the rear bumper. At the ends of this rear grille are diecast tail light housings that include a central horizontal bar continuing the central grille line, as shown in fig. 5.

## New Reliance Plant Features Modern Handling Methods

SPECIALLY designed hydraulic dock lifts, which are used in the shipping bay to raise or lower truck beds to the level of the shipping room floor for convenient electric truck access, are among the modern materials handling techniques featured in the new Reliance Electric & Engineering Co. plant at Ashtabula, Ohio.

The lifts, one of which is shown in fig. 1, are 10 x 15 ft, will handle axle loads up to 15,000 lb and have pushbutton control. Handling trucks can move directly onto the truck or trailer bed to load or unload materials; and in unloading operations the ease with which trucks can reach the materials allows easy palletization for transportation. The lifts, designed and developed by Reliance engineers, have an 18 in. vertical range.

Interdepartmental materials movements at Reliance are effected wherever possible by the use of gravity roller type conveyers, fig. 2. The longest such line serves the motor stator fabricating, machining, benching and inspection departments. On this line, which contains 1066 ft of conveyer, stators are moved horizontally from one processing station to another. The plant's winding department has 817 ft of roller conveyer and the motor assembly, inspection, testing, painting and shipping areas have a similar conveying system totaling 730 ft.

Each production line has its own storage area where finished assembly and miscellaneous parts and materials are loaded on pallets and skids and nested in steel racks, shown in fig. 3, designed to permit full utilization of space up to the roof trusses 15 ft above the floor. Fork type pallet trucks are used to handle the storage units.

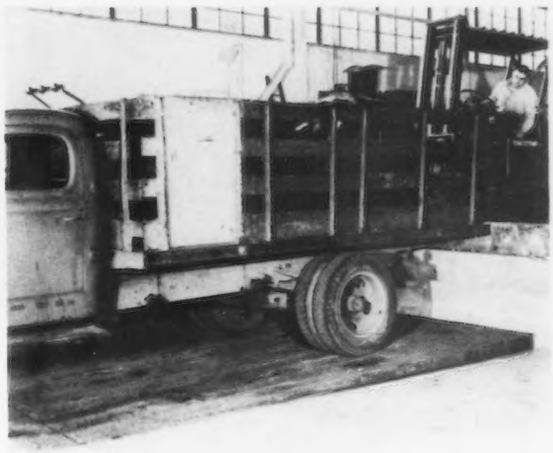


*FIG. 1 - Dock lift is shown raising truck bed to level of the shipping room floor so that the load is easily accessible to materials handling trucks.*

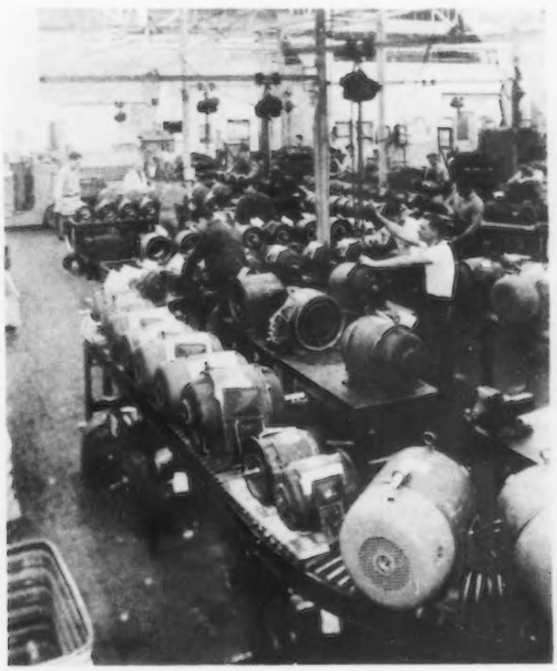
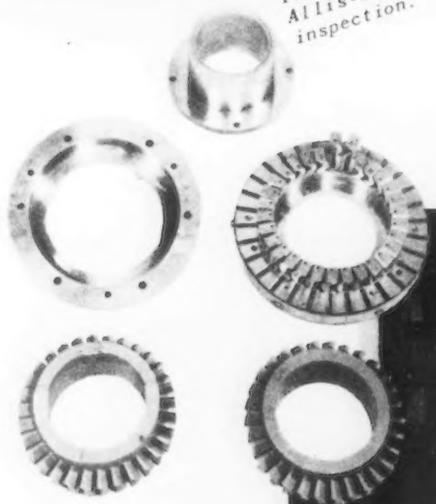


*FIG. 2 - Roller type conveyers are used to move motors and parts through processing and inspection operations. Jib cranes and electric motor-operated hoists remove and return work to the conveyers.*

*FIG. 3 - Storage racks for pallets and skids loaded with parts and materials are maintained for each production line.*

# Precision Casting at Allis-Chalmers

FIG. 1 - Typical precision cast parts being produced at the new Allis-Chalmers foundry are shown here in the course of final inspection.

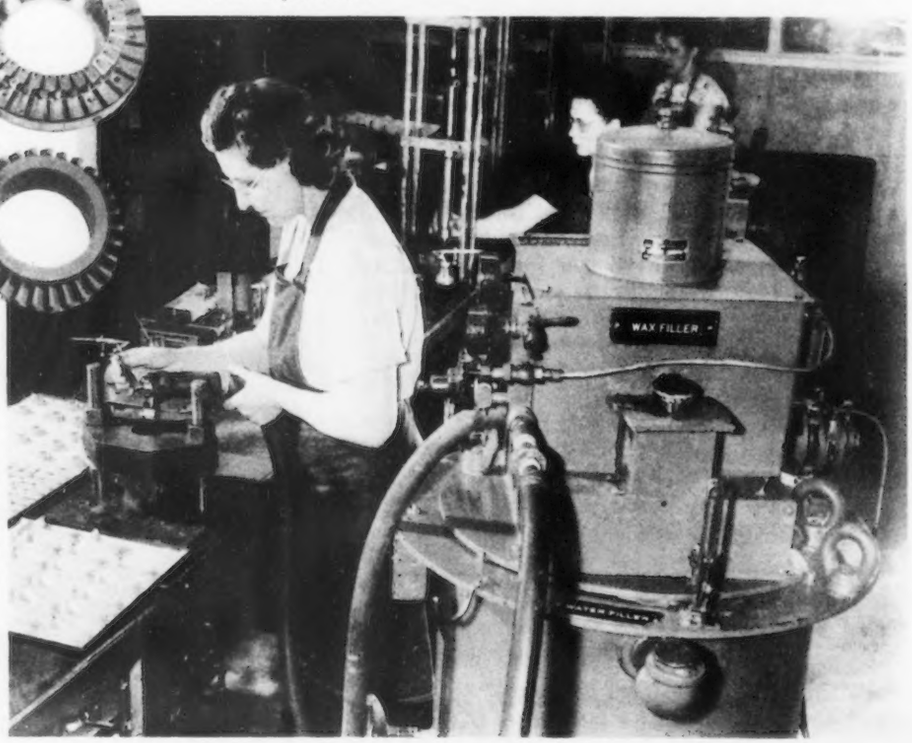


ABOVE

FIG. 2 - One of the larger castings produced at A-C is this 8-lb rotor. On the bottom is the wax pattern and finished casting. The die parts are shown above. Note the individual die segments which form the rotor blades and are retracted to permit removal of the patterns.

BELOW

FIG. 3 - Wax injection machine with multi-outlets. The wax, under constantly controlled conditions, is conveyed by hoses to the pattern.



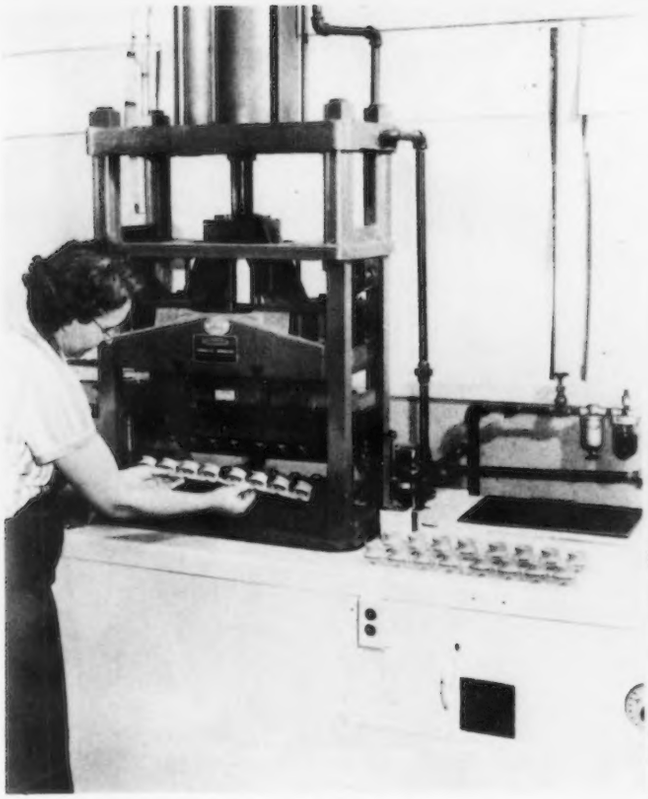


FIG. 4 - Removing patterns from a high production wax injection machine featuring automatic operation and thermostatic control of both wax and die temperature. Wax chamber is in the cabinet and electrical controls are in cabinet on which machine is mounted.

FIG. 5 - Applying silica sand by means of a motor-driven sifter to a pattern which has been dipped in slurry.

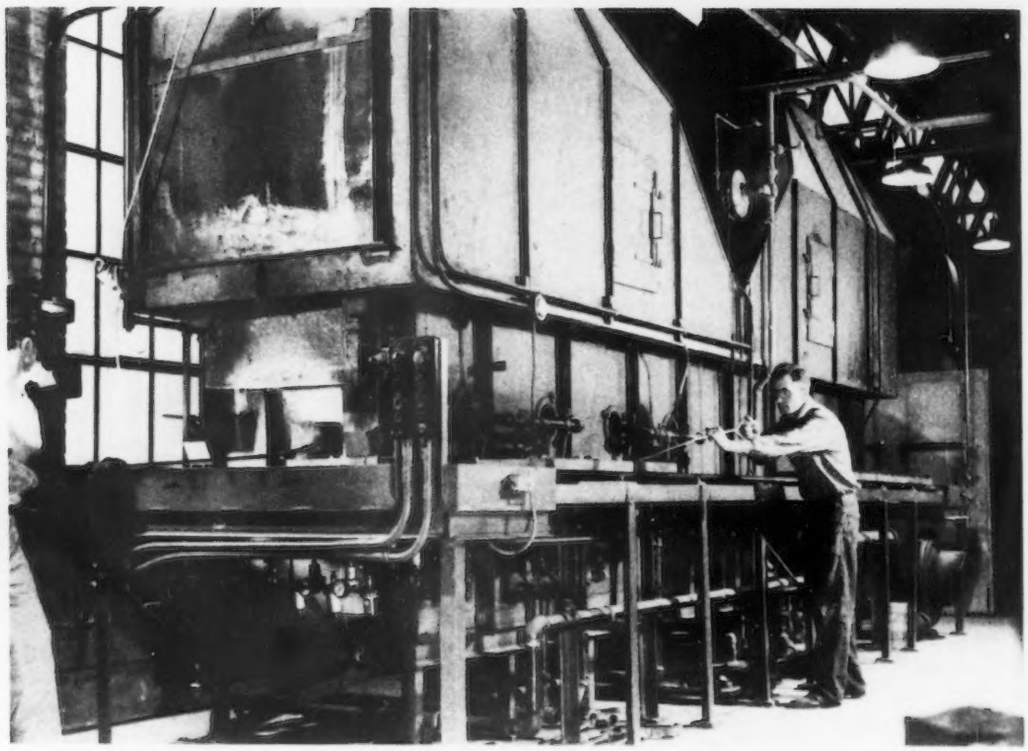
**One of the most modern precision investment casting shops operating is the new West Allis foundry of Allis-Chalmers Mfg. Co. Some notes on the equipment and techniques employed in this highly efficient postwar plant are described in this article.**

• • •

EMBODYING the latest techniques in precision investment casting production, the new plant of Allis-Chalmers Mfg. Co., West Allis, Wis., features a highly flexible yet basically very simple plant layout for producing castings by the lost wax process. Essentially a jobbing shop, this new plant is capable of pouring 100 lb of metal an hour, with room for tripling this volume if necessary.

Drawing heavily on experience gained in operating a precision casting supercharger bucket shop during the war, this new plant was designed and is operated to take advantage of standard foundry technique wherever possible. A wide variety of castings in both ferrous and nonferrous parts, some of which are shown in figs. 1 and 2, with the bulk of the work being done in alloy and stainless. The largest production casting made so far is a 10-lb stator disk with integrally-cast blades. The casting is done with such accuracy that no machining is required on the contour of the 29 blades on the inside diameter of the stator, nor on the 30 blades on the outer periphery of its 8-lb companion rotor (shown in fig. 2).

The operation is standardized on wax patterns, with three types of wax injection apparatus being used, including two types developed by A-C engineers. One of the wax injection units for general production work is shown in fig. 3. This unit has a central wax storage chamber from which wax is pumped under pressure to the injection nozzles through flexible hoses. The storage tank, pump and hoses are surrounded by water jackets in which water at a thermsotatically controlled temperature is circulated. This circulating water, which runs to the nozzle tip, assures a constant wax temperature. By bringing the wax to the die through the hose, this injector eliminates restrictions on die size, posi-



*ABOVE*

*FIG. 6 - Gas-fired pusher type furnace for mold heating. Empty trays move from exit to entrance end by means of a conveyer. Operator on right is moving an empty tray on the conveyer.*

o o o

*LEFT*

*FIG. 7 - One of the 30-kva, 9600-cycle induction melting furnaces having a capacity of 35 lb.*

FIG. 8 - Turntable used in pouring investment molds. Each ladle full can pour up to five molds.

tioning and mounting. The die sections are usually held in a pneumatic clamp operated by a foot pedal. Connection between the injection nozzle and the die is through Zerk fittings.

Another A-C designed injection machine, shown in fig. 4, designed for high production jobs, is almost completely automatic in operation. Pressing a button starts the cycle and the closing of the dies, injection, time delay for wax cooling, refilling of the wax gun, and opening of the dies take place automatically. On the job illustrated in fig. 4 the cycle runs 3 min. The machine is equipped with an air cylinder which can be attached to dies for core pulling. This cylinder does not operate as a part of the automatic cycle, since normally the horizonal cores serve to lift the completed patterns from the lower half as the dies separate, and to hold the pattern until the operator is ready to remove it. A separate pushbutton actuates the core puller as the operator removes the pattern. Besides being designed for automatic ejection of the patterns, dies are constructed with water channels for connection to a cooling water circulation system.

In addition to these two production injectors, several gun-type units are used for short runs and development work.

Allis-Chalmers uses a two coat investment for the bulk of its work, although some jobs require three—two applications of the primary and one of the secondary. The primary slurry is composed of silica flour (200 mesh), sodium silicate, HCl and water. After dipping in this slurry, 100 mesh silica sand is dusted on by means of the vibrating screen arrangement shown in fig. 5.

The secondary coating is made up of ground firebrick, 60 mesh natural silica sand, 80 mesh ground silica sand, tetra ethyl silicate (UCC's TES 40 material), alcohol, water, HCl, and MgO as the accelerator. Vacuum is not used in the setting of the investment.

The mold heating oven shown in fig. 6 is a propane-fired three-zone pusher type unit. The molds are in the oven from 5 to 8 hr, with the temperature working up from 200°F at the entrance to 1850°F at the exit end.

Melting equipment (see fig. 7), consists of four 30-kva, 9600-cycle induction furnaces, one of which is a portable unit used for cast iron, brass and bronze. Capacity of each furnace is 35 lb. These comparatively large furnaces are said to make possible especially close metallurgical control of a melt.

Standard gravity head pouring, on the turntable arrangement shown in fig. 8, is used almost exclusively, although vacuum is used with certain casting designs. The vacuum, ranging from 15 to 20 in. Hg, is applied to the bottom of the investment.

Cleaning, inspection, etc., is carried out in an efficient flow arrangement which minimizes rehandling and hauling. Among the many development projects carried out at the Allis-Chalmers foundry, one of the more interesting is the casting of blades for the company's coal-burning locomotive gas turbine. Made of S-590 high-temperature alloy, these complicated shapes are being cast to extremely high standards of accuracy and surface finish. The largest of these blades is about 10 in. long and 3½ in. wide, making it probably the largest blade ever successfully cast in a precision foundry.

Other interesting castings turned out at A-C include steam turbine spindle and cylinder blades; stainless steel castings for the food industry, including parts for donut machines, milk bottle filling machines, vegetable pulping machines, and beer barrel tap centers; high-velocity water jet nozzles for a streambarker; heads for a new type of golf club; parts for A-C circuit breakers, generator brush holder assemblies and other electrical equipment; many intricate levers, cams and other parts for an industrial sewing machine manufacturer; and agitator vanes and vane clamps for the A-C Hi-Density feeder.

# Stretch Forming

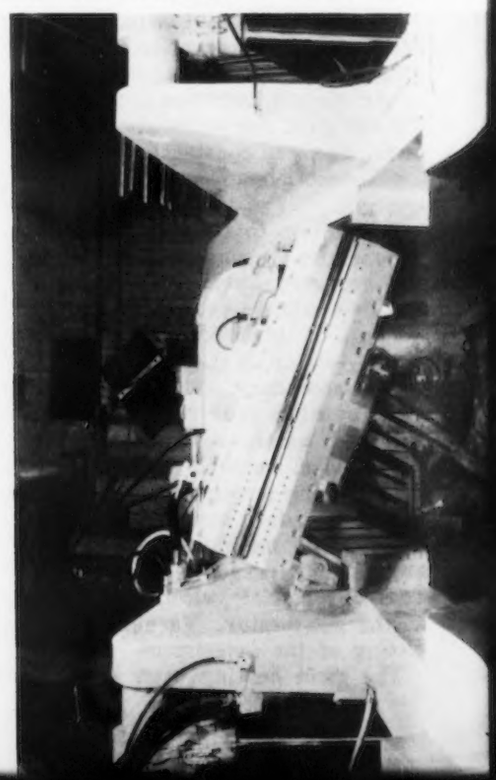
FIG. 1 - Aluminum alloy sheets are stretched over Kirksite dies to form aircraft parts formerly made on drophammers. The cylinders in the arms of the machine are each of 50 ton capacity.

FOR stretch forming aluminum alloy sheets, North American Aviation has installed a new 50-ton stretcher, built by the Hufford Machine Works, Inc., Redondo, Calif. This machine is believed to be the only one of its kind in existence and is adaptable to many jobs now done with drophammers and other stretching machines. Kirksite stretch-press dies are used, mounted between platens on adjustable die adaptors which can be moved forward or backward to accommodate various shaped dies.

Grippers or jaws, 42 in. wide and actuated by air cylinders, draw the sheet metal over the dies.

FIG. 2 - After prestretching the sheet, the arms, actuated by the hydraulic cylinders seen over and under each arm, fold back along the machine to form the part over the die. The amount of fold-back of the arms can be closely controlled, as can the speed of arm movement.

*FIG. 3 - The 42 in. wide jaws are made up of seven 6-in. elements, assuring even gripping. The jaws are shown here rotated about 20°, a feature that permits the jaw and sheet to follow die contour when non-symmetrical parts are formed.*



# Aluminum Sheets

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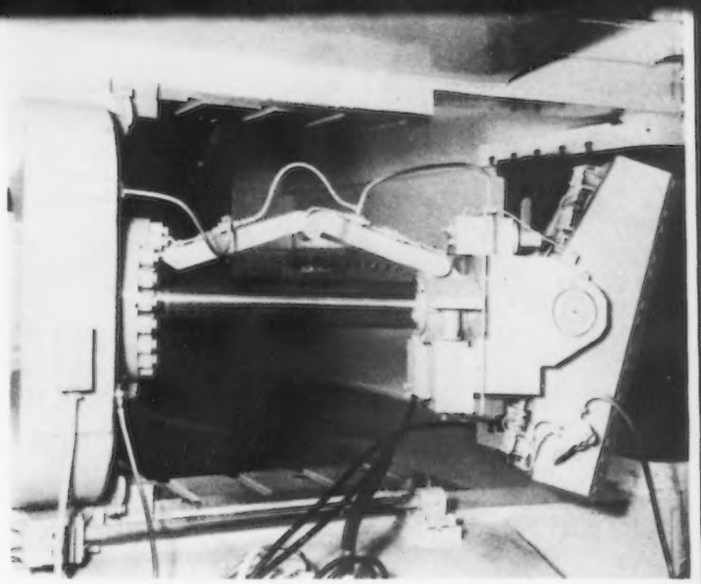


*FIG. 4 - The jaw can also be oscillated up to 20°, as shown here. The lead screw is motorized to move the tension cylinder yoke in or out to accomodate the length of the sheet being formed.*

Inserts in the jaws consist of seven separate 6 in. gripping elements, each pair of inserts being actuated by an air cylinder. These increments, mounted on rollers inside the housing, compensate for minor variations in stock thickness, assuring a grip over the full width of the sheet. The middle three, the middle five, or all seven inserts can be actuated as a unit, thus eliminating the necessity of shimming unused inserts.

The jaws can rotate about 20° in either direction, permitting the jaw and sheet being formed to follow die contour. The jaw can also be oscillated up to about 20° in either direction. This allows the jaw to conform to the end contour of the part being formed; to balance the stretching action when forming a non-symmetrical part, especially where the draw is deeper on one edge than the other; and to equalize forming stresses across the width of the sheet being formed, reducing the concentrated stressing at any one spot in the sheet.

The tension cylinders, mounted in the arms at either side of the die, can be adjusted by lead screws as to location in relation to the die so as to accommodate sheets of varying lengths. Initial tension is placed on the part being formed, and the part is then wrapped around the stationary die under tension. After the forming has been completed, additional pressure is applied by the tension cylinders to set the material and eliminate or reduce the spring back of the material The arms are actuated by four hydraulic cylinders, one over and one under each arm. These control the forward and backward movement of the arms.

With the arms extended, the machine is 33-ft wide and 24-ft deep. It will handle sheets up to 42-in. wide. For 90° bends, the machine will handle sheets up to 12-ft long; for 110° bends, up to 10-ft long; and for 180° bends, the maximum sheet length accommodated is 8-ft. The yield point of the material being formed determines the maximum thickness the machine will handle. The maximum tension cylinder pull is 106,000 lb, so an indication of the material thickness can be gained by the following formula:

$$\text{Material thickness} = \frac{106{,}000}{\text{Width of sheet to form X material yield point}}$$

The maximum width of the die that can be accommodated by the machine is 12-ft; maximum height is 47-in.; maximum depth is 4-ft; and minimum width for a 180° bend is 30-in. The tension cylinders, mounted horizontally in the yokes or arms, have an effective pulling area of 107 sq in., in maximum speed of 80 ipm; and a maximum operating pressure of 1000 psi.

The arm or yoke actuating cylinders have a 75-in. stroke; a maximum speed 90° arm movement in 30 sec; and a maximum operating pressure of 1000 psi. The speed of each arm is controlled independently, and the amount of rotation of each, from 0 to 90°, is controlled by adjusting limit switch cams.

*FIG. 5 - This shows the arm fully retracted as in forming a part with a 180° contour. The cylinders over and under the arm are also shown. The tension cylinder in the arm can be rotated slightly in the yoke, permitting better control of the forming of the sheet.*

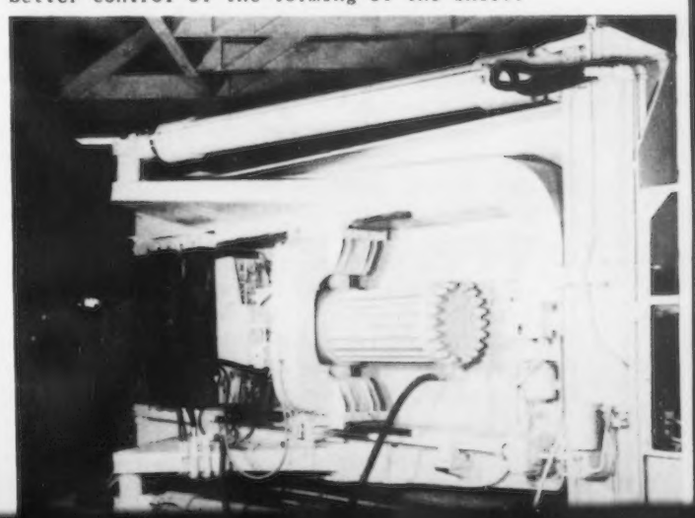


FIG. 1 - Standard basic skid has corner stakes and end panels in place to prevent skidding of the load of metal strip.

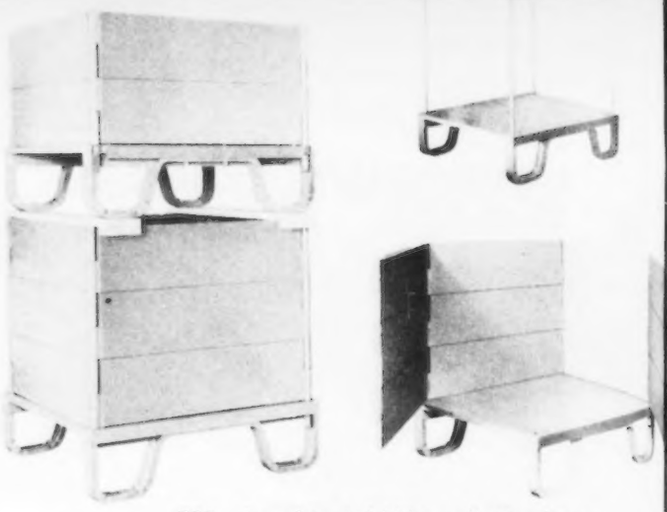


FIG. 2 - Adaptability of the basic skid platform allows tiering. The assembly of different height boxes is accomplished by varying the number of side panels secured with corner stakes.

# Versatile Skid Expedites Material

By L. M. BECKWITH
*Market Forge Co.,*
*Everett, Mass.*

HANDLING and storage of raw materials, finished products, tools and dies, stampings and other materials has been simplified by the use of versatile handling equipment at the Market Forge Co., Everett, Mass.

In an effort to achieve the maximum flexibility and efficiency from the least number of handling units, a basic skid platform 42-in. wide and 50-in. long, shown in fig. 1, was selected. These skids were designed with 3-in. channel legs to permit as much as 30,000 lb to be loaded in multiple tiers. The skids were also provided with stake sockets at each corner and with detachable steel side panels to allow formation of boxes of different heights and with any number of sides. These possibilities for flexibility are illustrated in fig. 2.

Three types of trucks are used for handling the skid platforms. High lift electric trucks are used for long hauls in the plant, for loading and unloading trucks and freight cars and for stacking the skids for storage purposes, as shown in fig. 3. Storage battery "walkie" type trucks are used for transportation between departments. Hand lift trucks are used for departmental use.

The use of individual skids with shelves and high stakes, fig. 4, provides a convenient system for storage parts either adjacent to the presses and assembly line or in warehouses. Basic skids are used and the partitions which make up the various compartments are the basic side panels. The sockets in each skid allow the use of pipe stakes held rigidly and confined by holes pierced in the shelves. It is a simple matter to set up this storage arrangement without unloading skids at any time.

The skid platforms and boxes serve many purposes at Market Forge, being used for easy access by press operators to parts; as plain flat skids for overhanging loads; with end panels only to restrain loads; with high end racks for light materials; for multiple tiering, loaded with sheets; for storage of tools, dies and fixtures; for easy transportation of materials and implements to and from the presses as in fig. 5; and with multiple decks for loading and storing assorted materials.

Solid skid boxes are also found useful, especially in storing parts in outdoor storage space protected with a roof only. Boxes 36-in. square and 24-in. deep with angles on the top to permit multiple tiering are used. When stored one on top

*FIG. 3 - Electric lift truck is stacking skids loaded with metal sheets. Tiering of heavy loads is made possible by 30,000-lb capacity of the skids.*

o o o

*FIG. 4 - Shelf and storage system uses the basic skids. Partitions of the various compartments are the basic side panels shown in fig. 2.*

# Handling in Stamping Plant

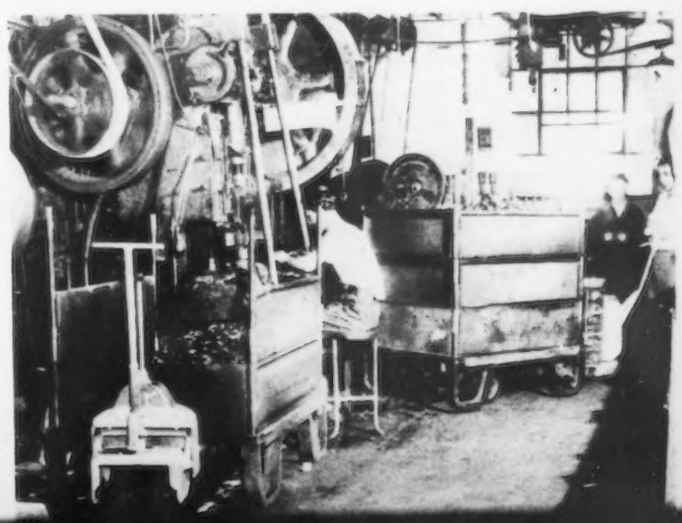
***Economical material handling in metal stamping plants is complicated by the variety and weight of items which must be transported and stored. This article describes an adaptable skid platform system successfully used in one plant to obtain wide flexibility from a small number of handling units. The techniques have proved capable of handling all the plant materials from small stamped parts to stocks of large metal sheets.***

of the other without covers each compartment is accessible. However, for outdoor storage a cover is used to prevent the weather from affecting parts. This arrangement also prevents unsanctioned access to the different bins as an electric truck is required to lift the units for access.

A third standard handling unit found to be very useful throughout the plant is a steel hand truck 30-in. wide and 36-in. long which is provided with four stake sockets, one in each corner, to allow the application of many types of standard load carrying devices such as rod and tube racks, boxes, boxes and shelves, leaf truck units, stakes, push handles or specially designed fixtures. The running gear can be altered very rapidly as the upper body or chassis is furnished with prepunched holes to allow the gear to be set in tilt, nontilt or dolly type arrangements.

These trucks are used within each department and usually remain in the department until the work is to be sent for storage. Loads on the trucks usually vary from 2000 to 3000 lb and can be easily maneuvered by one man.

*FIG. 5 - Skid boxes are being used for moving stampings from the press room. On the two skids shown, side panels have been erected to form boxes of different heights.*



# One-way Paper Shipping Pallets

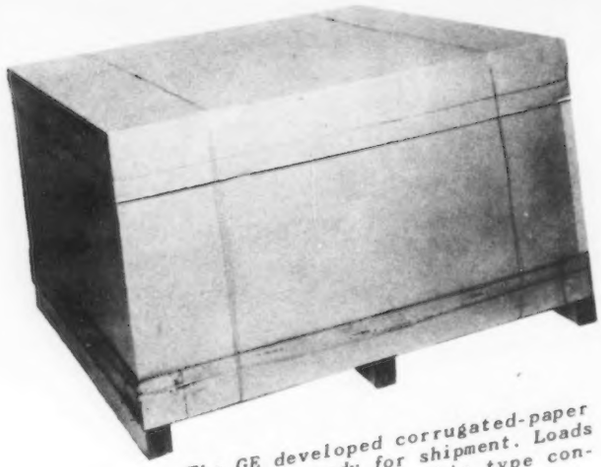


FIG. 1 - The GE developed corrugated-paper pallet strapped and ready for shipment. Loads up to 1-ton are shipped in this type container.


By E. H. ASHLEY

*Production Div., General Electric Co., Schenectady*


SHIPPING pallets, shown in fig. 1, made of corrugated fiber can be effectively used in many instances to reduce materials handling expense. At the Schenectady plant of the General Electric Co., these pallets are used for interplant truck shipments and have even been used when shipping carload material by rail. In many cases, savings resulting from the lower shipping charges on one trip have equalled the cost of the pallet.

These pallets can be considered as strictly expendable if necessary, and thrown away at the end of a long trip to eliminate the freight cost of returning them. Weighing 8 lb. and measuring 48x44 in., they cost about one third as much as comparable wooden pallets and weigh about a tenth as much.

They are made of standard 275-lb test, A-flute, single-wall, corrugated kraft fiber board. Basic design consists of a corner cut and scored sheet with 4-in. flanges on each of four edges, corrugations running the long way.

Three built-up corrugated runners that can be made of any kind of double-faced, corrugated-board sheets are fastened to the bottom of the main sheet.

These runners, shown in fig. 2, are 2½-in. wide, 44-in. long, and are built up to a thickness of 2½-in. by glueing strips of the material together. Three runners are equally spaced on the 48-in. side of the top sheet, with corrugations running vertically to the base of the pallet. These runners are fastened to the pallet base by glue applied over the entire top surface of the runner.

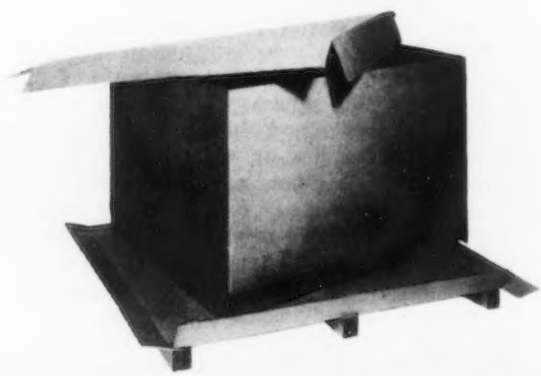
The corrugated pallets were designed by General Electric packaging and shipping specialists, and are made for the company by fabricators of regular corrugated items. They are regularly being used for shipments weighing up to about a ton.

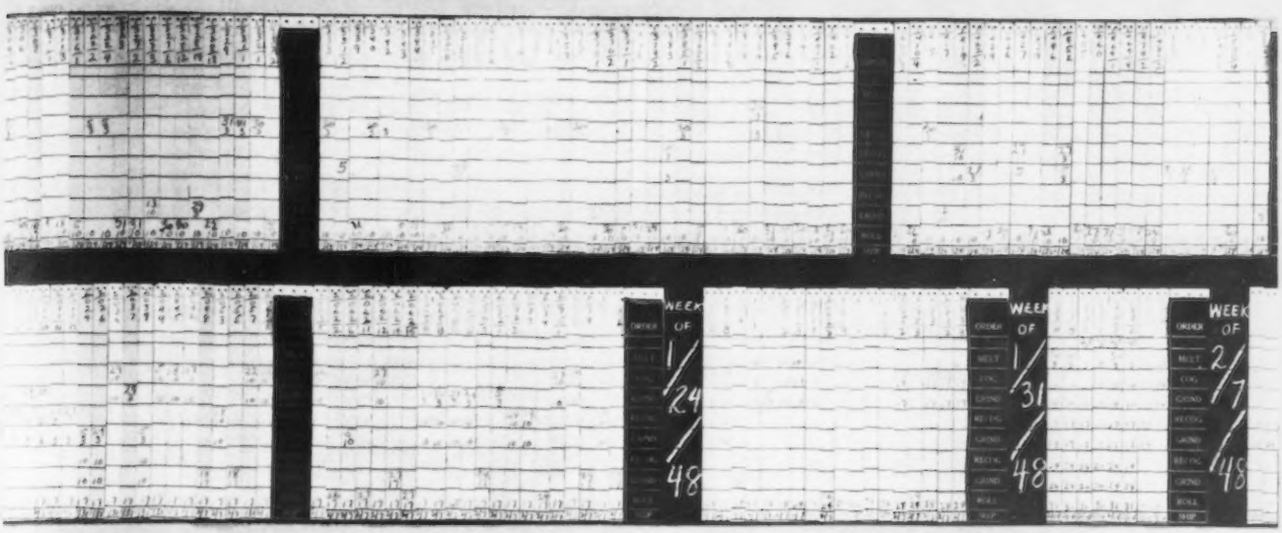
Although originally planned for one trip use, many of these pallets have shown exceptional durability. Because of the nature of their construction and material, however, there are certain limitations to their use. They are not waterproof, and probably cannot be made so. This makes it inadvisable to expose the pallet to conditions known to be unfavorable to ordinary corrugated containers of similar material.

Furthermore, the load is best placed on the pallet so that the weight is distributed over the entire surface and not concentrated at one or two points. It is also advisable, of course, to avoid loads which have sharp corners or points, unless these loads are first crated or skidded.

With these considerations in mind, however, experience has shown that paper-pallet loads can be handled with either mechanical or hand lift and fork trucks with no more attention than that given to the standard wooden units.

FIG. 2 - The components of the corrugated-paper pallet. The runners under the pallet have remarkable resistance to crushing, and the loaded pallet can be handled easily by forked lift trucks.






*Heart of the production control system is the order control panel, a section of which is shown here.*

# Production Control

## . . . *In a High Alloy Steel Plant*

***A simple yet extremely effective production control method employed by the Watervleit plant of Allegheny Ludlum Steel Corp. to handle a multiplicity of orders demanding a wide variety of operations is explained in this article. This control technique, which tells at a glance the status of every order being processed, requires only a very moderate personnel to maintain.***

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By G. R. REINDEL

*Allegheny Ludlum Steel Corp., Watervleit, N. Y.*

o o o

IN most specialty steel plants there are usually an exceptionally large number of orders, large and small, for a wide assortment of grades and analyses of steels. Each of these orders, because of the nature of the product involved, usually is to fill a definite need and must be processed to meet a specified deadline. For that reason, as well as to show up bottlenecks and to assist in cost control, it is necesary for the plant's production control department to keep in close touch with the progress on each order at all times.

A simple, yet extremely effective, production control system used at the Watervliet plant of Allegheny Ludlum Steel Corp. provides an accurate, continuing report of the status of all work being processed in the plant, with the added advantage of requiring only a very small personnel to operate.

The manufacturing order, representing the first step in this production control system, is written in the service department by order issue

## MANUFACTURING ORDER

A. L. S. Co. WATERVLIET, N. Y.

PROMISED | CUSTOMER | Order No.

| ORDER | AMOUNT |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

Size
Tolerance
C.G./Pol.
Tolerance

STEEL APPLIED

| From | No. | Size | Wt |
|---|---|---|---|
| Ingots | | | |
| Billets | | | |
| | | | |
| | | | |

HEAT

| GRADE | ANALYSIS | CONDITION |
|---|---|---|
| | C.<br>CR.<br>NI. | |

| SPECS | HEAT TREAT |
|---|---|
| P.L. | R.S. |
| T.S. | W.Q. |
| P.S. | O.Q. |
| Y.S. | DR. |
| IZOD. | |

MEMORANDA

SPECIFICATION NOTES

| | COG | GRIND | RE-COG | GRIND | RE-COG | GRIND | FINISH |
|---|---|---|---|---|---|---|---|
| Mill or Hammer | | | | | | | |
| Furnace | | | | | | | |
| Sch. Date | | | | | | | |
| Make | | | | | | | |
| Cut | | | | | | | |

| | No. | Wt. | No. | Wt. | No. | Wt. | No. | Wt. | No. | Wt. | No. | Wt. | No. | Wt. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Received | | | | | | | | | | | | | | |
| Forward | | | | | | | | | | | | | | |
| Billet | | | | | | | | | | | | | | |
| Scrap | | | | | | | | | | | | | | |
| Scale | | | | | | | | | | | | | | |
| Replace | | | | | | | | | | | | | | |
| Reason | | | | | | | | | | | | | | |
| Posted | | | | | | | | | | | | | | |

DISPOSITION

| | WEIGHT |
|---|---|
| Received | |
| Ship On Order | |
| | |
| | |
| | |
| Stock | |
| Billet | |
| Scrap | |
| Replace | |
| Reason | |
| Posted | |

*FIG. 1 - The manufacturing order form which contains all essential information on the type of steel, processing steps, and whether ingots or billets will be used.*

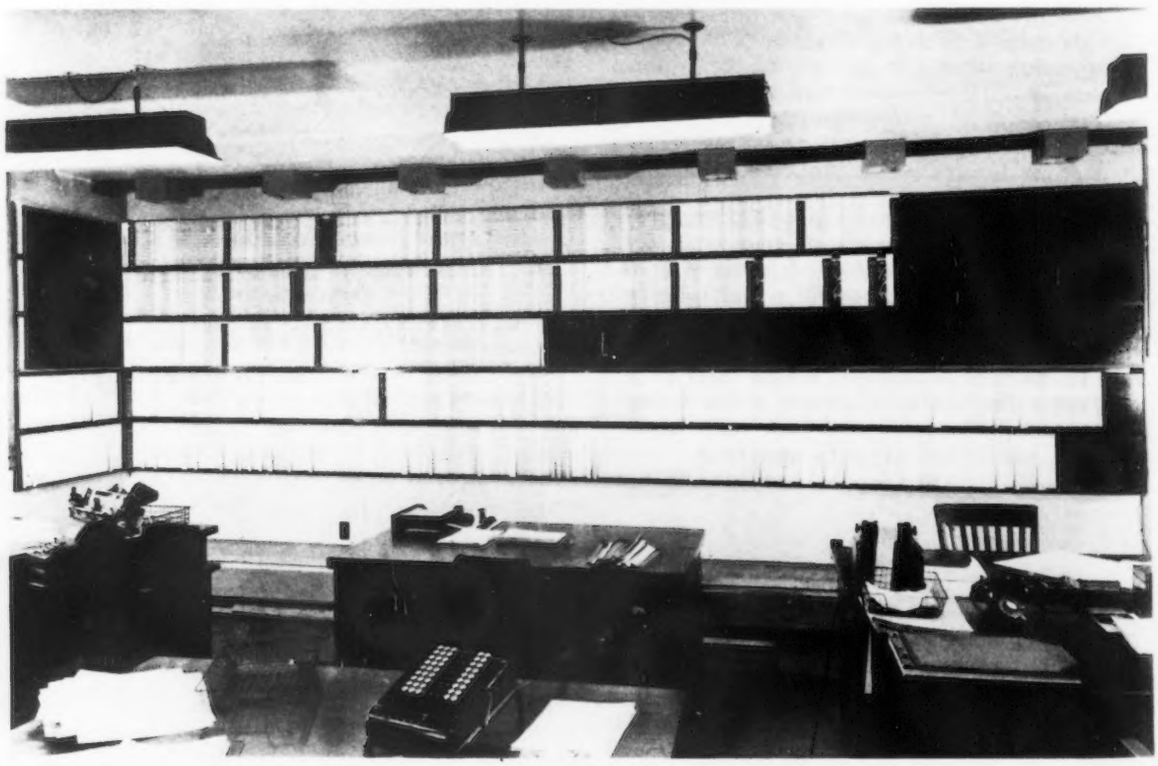


*FIG. 2 - Overall view of the production control panel at Allegheny Ludlum's Watervliet plant.*

clerks. This comprises the typing of the manufacturing order in triplicate, putting on it all of the data and specification requirements needed for the processing of the steel as given on the work sheet copy of the order.

Reference to the fine of ingots and billets in stock determines the ingots or billets of proper size and specification for producing this order, and this information is assigned on the manufacturing copy accordingly. A specimen manufacturing order is shown in fig. 1.

The condition of the steel issued on an order —that is, whether ingots or billets, and if billets, what size—determines the necessary subsequent operations to produce the finished product. These operations are indicated by the order issuing clerk in the columns provided at the bottom of the manufacturing order (fig. 1) and at the same time entering on this form the specified sizes for which such operations are to pick up and leave off, proceeding to the next operation.

When such manufacturing orders are completely written, the original and duplicate are routed to the scheduling desk and the triplicate is sent to the standard cost department for use in determining costs and for comparing actual performance against the standards set up.

At the scheduling desk, the required operations on the order are fitted into the schedule against open capacity and the scheduled dates for the completion of the various operations are written in the columns. When the dates for the completion of the various operations have been scheduled, the manufacturing orders are routed through the posting desk where the quantities involved are posted to operating center accounts on ledger sheets.

These accumulated postings provide a running total of weights scheduled at each operating center. Comparison of these totals with the capacities of the center are used in determining subsequent scheduling or allocation.

After posting, the scheduled dates of the key operations are entered on the control copy of the order and the manufacturing copy is routed to the control board shown in fig. 2.

At the control board a strip is headed with the order number and the scheduled dates of the various rolling operations are written in the lower half of the space assigned for each operation as illustrated in fig. 3.

These strips are then hung on the rolling mill control board (fig. 2) in numerical sequence within the groupings according to the week of finish roll (see fig. 3). The duplicate manufacturing order copy is then filed numerically in the control file where it remains until the original manufacturing order is returned from the mill upon completion of the order either by shipment, cancellation or rejection whereupon the duplicate copy is destroyed and the original on which all mill records have been made, is filed in a filled order file numerically arranged.

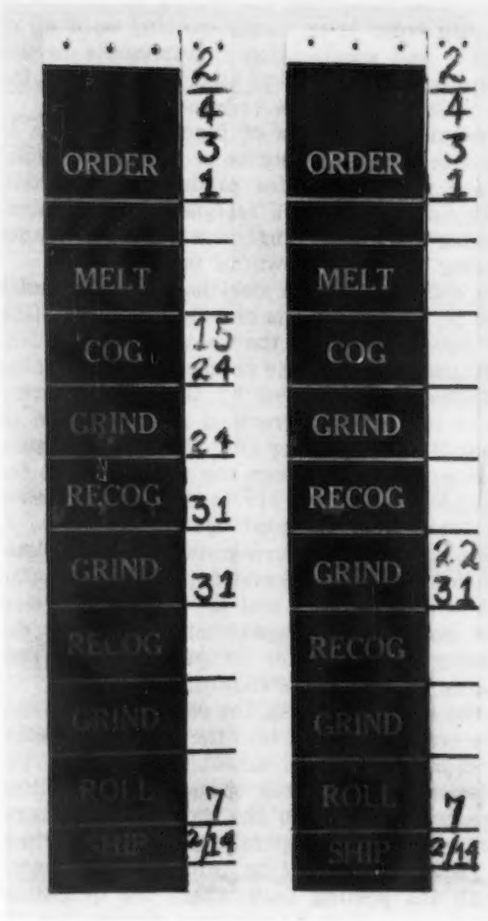
While an order is in the mill its progress is recorded on mill reports at the various operating centers and such reports are cleared through the mill control board with entries to reflect progress on the strips for each order. The entries from the mill reports, as for instance an operating center reporting the completion of an operation on a certain order and forwarding it to the next operation, would cause personnel at the control board to erase from the square applicable to that operation the entries for that operation and enter in the upper half of the next square, above the scheduled date previously written in, the date the material was available for the next operation, in the manner shown in fig. 4. If within the scheduled date, the new entry is shown in green; if beyond the scheduled date, it is shown in red

*FIG. 3 - Original entries on the control strip, shown here, indicate the scheduled dates of various production operations.*

For example, strip A in fig. 4 shows an order scheduled for cog, grind, recog, grind, roll and ship with work started on the cogging operations on Jan. 15, as indicated by the numeral 15 above the schedule deadline date, 24, in the cog space. Strip B is material of the same job with work having advanced to the grind operation as evidenced by the numeral 22 written above the scheduled date, 31, in the grind space. On the order in strip B, previous operations have been completed and entries erased from the strip.

In this manner the progress of every order in the rolling mill is recorded on a readily visible record where a trend to a delayed schedule in any operation is indicated by the frequency of red dates in that operation. This serves as a

FIG. 4 - Progress of an order is followed by modifications on control strips. Strip A shows the material has reached cogging operations on the 15th, with a scheduled date of the 24th. Strip B shows the order has progressed to the grinding step. Completed operations are erased.




guide to the plant expediter and to the scheduling and planning.

As orders are completed in the final mill operation and proceed to the finishing department, the paper strip on the control board for that order is removed from that section of the board assigned to the rolling mill, and dropped to the finishing department section of the board where it is hung in groups determined by the scheduled shipping date. In the mill section of the board the orders are grouped in numerical sequence by calendar weeks determined by the date of the finishing operation.

At the expiration of each calendar week any orders that have not been completed through the final mill process become late orders and the strips for such orders are tagged and placed in numerical sequence to the left of the guide strip marked "Late Orders." As orders are shipped and the shipping notification is cleared across the control board, the order strip is removed from the board so that at all times only work in process is represented on the board. If an order is cancelled or rejected and replaced, the rejected order strip is removd from the board and a new strip with the scheduled dates for the replacement is placed on the board in proper position.

*Details of several other types of production control methods were given the following articles appearing in THE IRON AGE.*

*Donald Peddie, "Production Control - As Applied in a Farm Tractor Plant," January 29, 1948, p. 56.*

*W.G. Thannert, "Production Control at Caterpillar," June 26, p. 40; July 10, 1947, p. 52.*

*T.A. McMullen & J.H. Quick, "Standard Systems Vital Aid to Management," Dec. 26, 1946, p. 48.*

*R.A. Trumpis, "Production Control for Small Plants," July 25, 1946, p. 49.*

*J.A. Coltrin, "Putting Production Control to Work," May 16, 1946, p. 41.*

# New Gas-Making Process Developed

A NEW gas-cracking process has been announced by Surface Combustion Corp., Toledo, as a means of overcoming difficulties encountered in securing adequate year-round fuel service. This process can be utilized to increase present capacity to handle peak loads and also as standby capacity.

The principal item of equipment is the catalytic cracking furnace which breaks down or cracks a hydrocarbon vapor into a fixed gas. The process has recently been improved by making possible the use of heavy hydrocarbons such as 26 RVP (Reed Vapor Pressure) gasoline or wild gasoline, and straight run gasoline, in addition to propane, as the base feed stock. The addition of the two gasoline fuels to the list of raw materials available for catalytic cracking greatly increases the scope of the process and simplifies the important problem of storage.

In addition to simplicity of operation, catalytic cracking plants of this type possess the advantage of unusual compactness. For example, a plant now being designed for a capacity of 5 million cu ft per day will occupy a ground area of only 18x22 ft for the furnace. Additional space requirements for a vaporizor house, or handling equipment, and a control room, are relatively small.

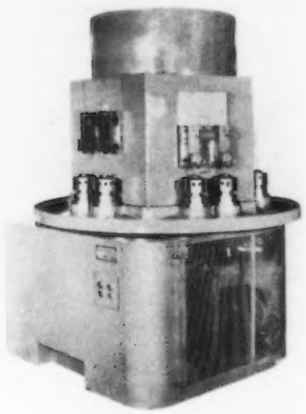
Where large industrial installations are concerned involving a considerable variety of gas-burning appliances and furnaces, the cracked-gas plant offers advantages of greater flexibility in producing a gas more interchangeable with the existing fuel gas. Transfer from the one to the other would involve a minimum of interference with production. The composition and gravity of the standby ga scould be so governed that most of the equipment would respond to the substitute gas without change or adjustment. The process can also be applied to the smaller plants where there is a limited amount of fuel burning equipment which can be given the necessary attention when changing over from the existing fuel gas to say a propane-air mixture.

# New Production Ideas . . .

New and improved equipment and methods described this week include: A precision boring machine with carbide boring bars, a multi-drilling machine, standardized spot welding guns with interchangeable parts, a pipe and bolt threader, an automatic coolant clarifier, a hydrostatic tube tester, a circular turning tool, an acid dip agent, and a burn ointment.

### Boring Machine

A HIGH-PRODUCTION precision boring machine designed for the use of solid cemented carbide boring bars developed by *Carboloy Co., Inc.*, Detroit 32, has been announced by *Hoern & Dilts, Inc.*, 925 Rust Ave., Saginaw, Mich. This Model 10-5 is a five station, ten spindle machine with a Carboloy boring bar for each work spindle. Standard carbide boring bits are inserted in each boring bar. The head of the machine is pentagonal, each side carrying two boring bars. The head and work table revolve continuously, work spindles stop turning at the loading station, and the boring bars retract. The spindles start automatically when the loading station has been passed. Inserts of Carboloy cemented carbide are also used on the cams. Production ranges from 1400 pieces per hr for pieces having a depth-to-diameter ratio of 6:1, to 800 per hr for guides bored from each end. Carbide tools chamfer the guide on the OD, while the ID is being bored. Spindle and work table speeds are changed by interchangeable V-belt pulleys in the drive from the main 10 hp, 1800 rpm spindle drive and the 2 hp drive motors. Capacity of the work for the Model 10-5 is 3 in. max OD and ¼ in. min ID. Maximum boring depth on the standard machine is 5 in.



### Multi-Operation Machine

DRILLING, boring, reaming, counterboring and tapping operations on automobile front wheel spindle supports are performed on a new 6-station multi-operation machine equipped with an automatic power indexing trunion for transferring parts from the loading station through five machining stations. Components of this machine, which is manufactured by *Baker Bros., Inc.*, Toledo, Ohio, include two standard hydraulic feed units, located to the right and left of the indexing trunion. Master driver boxes are mounted on standard model drive brackets, and the drive is through V belts, with pick-off speed change gearing to master driver box and spindles. An auxiliary model hydraulic feed unit is equipped with a 4-spindle head and an auxiliary 4-spindle tapping unit, which are mounted to the rear of the trunion for tap drilling and tapping four small cross holes. The tapping unit is mounted on the feeding saddle with an air cylinder for rapid advance and return, allowing the unit to clear the trunion for indexing.

### Hand Miller

VERTICAL feed of the head has been incorporated on the No. 1 hand miller built by *U. S. Machine Tool Co.*, 16 E. 72nd St., Cincinnati 16, for high production runs on cutoffs, keywaying, and similar milling operations. This machine is also recommended for short production runs and tool room work on milling, boring and drilling. The miller can be equipped with special arbors, plain or swivel vises, vertical milling attachments and dividing heads. The spindle features tapered roller bearings, and speed varies from 160 to 1450 rpm. Vertical feed range is 15¾ in. on the knee and 4 in. on the spindle head.

### Air-Operated Butt Welder

FOR end to end welding of round and rectangular stock, a butt welder which is air-operated has been introduced by *Larkin Lectro Products Corp.*, 160 W. 146th St., New York 30. It features automatic control of welding jaws, upset pres-

sure, and has five heat controls for different types of work. Dies are interchangeable and high-speed air-actuated welding jigs guarantee production rates as high as 20 welds per min. Model BA-10, illustrated, 10-kva capacity, is suitable for round stock up to $\frac{3}{8}$ in. diam, or its equivalent in flat and rectangular material. The welder is available in capacities from 10 to 75 kva, and also in hand-operated models from 10 to 30 kva.

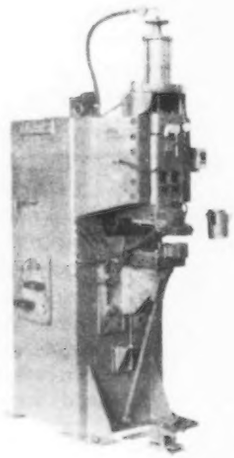
### Portable Welder

HAVING a 20 to 180 amp range, a new gasoline engine driven portable welder can be used for the welding of light or heavy gage metal and for the repair of cast iron structures. This machine, announced by *Lincoln Electric Co.*, Cleveland 1, is known as the Linc-

welder, and is suitable for use where electric power is not readily available. It measures 2x2x4 ft. The welder has three ranges of output current, and continuous adjustment is obtained by a simple speed control. The welder is powered by a Wisconsin air-cooled 2-cylinder engine, with engine speed determining the welding current. Equipped with a 3½-gal gasoline tank, the unit will operate under normal welding conditions for approximately 6 hr before refueling.

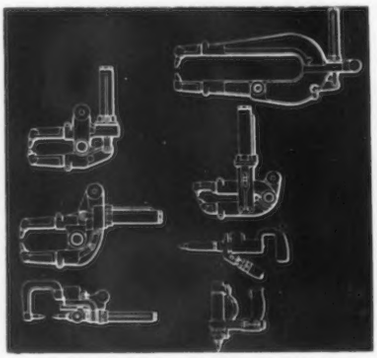
### Special Projection Welder

WELDING of kitchen utensils is being done four times as fast as before with a new projection welder developed by *Federal Machine & Welder Co.*, Warren, Ohio. One cycle of current completes the weld. Short and precise timing is controlled with a synchronous panel and the high current capacity necessary for welding light materials of large areas at short intervals of time is obtained with a 175 kva water-cooled transformer. A special low inertia spring head gives a quick follow-up. Standard T-slot platens permit quick and easy change of dies. The adjustable non-retractable stroke cylinder makes possible the use of various sizes and designs of dies for the welding of all types of kitchen utensils.



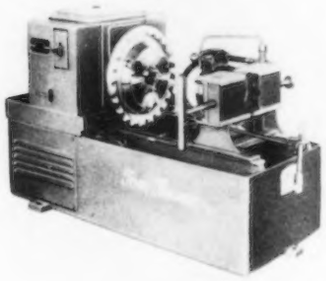
### Spot Welding Guns

STANDARDIZED spot welding guns, constructed from interchangeable component parts, have been announced by *Progressive Welder Co.*, 3050 E. Outer Dr., Detroit 12. Seven basic gun types, in heavy duty and standard duty versions, will take care of 95 pct of all gun welding requirements. A gun can be quickly converted to a different job by changing standardized low cost parts. Basic standardized components of the welding guns are the chassis, the jaw extensions, the hydraulic or air operating cylinders, optional cable locations, handles, and universal cable terminal clamps, switches, electrodes, and electrode holders. With this standardization, as many as 57,600 practical variations are possible with a single basic gun chassis, varying only the jaw extensions and standard electrodes. In addition to standard gun components, many other units, such as boosters, air valves, and other sub-assemblies, have been standardized. To suit such requirements as cannot be covered with the completely standardized gun line, a number of special variations are available.



### Portable Threading Machine

AN electrically powered pipe and bolt threader having a standard range of ¼ to 2-in pipe has been announced by *Oster Mfg. Co.*, 2085 E. 61st St., Cleveland 3. Pipe or studs as short as 2½ in. can be threaded on one end and 2-in. diam

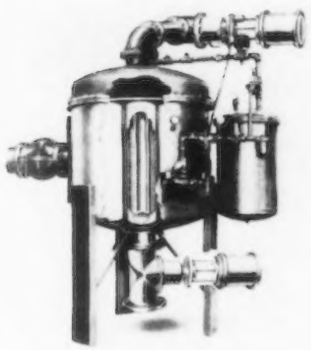


nipples as short as 3½ in. can be threaded on both ends without using a nipple chuck. A front chuck known as the Spinfast eliminates need of a chuck wrench. A quick spin of the chuck wheel chucks and unchucks the pipe. The die-head is the quick-opening, adjustable floating type with top opening to permit view of the thread as it is cut, and bottom opening for chips to fall into pan. Dies are long-lead for easy starting and cutting, and all dies are adjusted simultaneously. The motor is universal, reversible, variable speed for 110 v, either ac or dc single phase.

### Coolant Clarifier

AN automatic clarifier which removes abrasives, dirt and other contamination from water soluble coolants used in grinding, various machining operations, and rolling, has been announced by *Honan-Crane Corp.*, 910 Sixth St., Lebanon, Ind. Coolant is filtered under pressure through mesh

screens of Monel wire cloth. It is possible to remove particles as small as 5 to 10 microns. Abrasives are permitted to build up on the screen for a predetermined time, after which an electric timer actuates blow-down mechanism, forcing clean coolant under pressure, back



against the filtering screens. This forces particles off the screens and they are carried along with the liquid out of the clarifier. At the end of a 5-sec blow-down period, the procedure is reversed and the flow of coolant to be filtered starts back through the clarifier. The entire operation is automatic and requires no attention from the operator. Seven sizes are available, ranging from a single tube model with a flow rate of 5 to 15 gpm, to one with 37 tubes and a flow rate of 1000 to 1200 gpm.

### Tube Tester

A HYDROSTATIC tubing tester designed to test tubing of $\frac{3}{4}$ to $3\frac{1}{2}$ in. OD and from 10 to 26 ft long, at pressures selected and preset from 750 to 3000 lb, has been announced by *R. D. Wood Co.*, Philadelphia 5. The testing of the

tubes is conducted with a fluid, usually water, under hydraulic pressure. Average tubes of $3\frac{1}{2}$-in. diam and 26 ft long can be tested in 45 sec or at a rate of 80 per hr. The machine is a long flat steel bench with steel tension bars along the top of both sides. These bars are drilled so that guides and head can be moved in 6-in. increments. The tube to be tested is held between two ends or heads, which also seal the tube. The resistance head may be adjusted by means of the drilled holes in the tension bars, while the other head is movable and applies the pressure to the tube. The movable head is arranged for a 12-in. max stroke or an 8-in. min stroke. A high pressure oil hydraulic operating cylinder delivers the thrust on the movable head; and the fluid is introduced into the tube through a passage in the cylinder. The entire operation may be controlled by one man from a control panel. All pumps and associated equipment are self-contained.

### Quick-Acting Collet Chuck

TO speed chucking operations on South Bend, Logan, Atlas and similar types of lathes, a quick-acting collet chuck has been developed by *Goodwin Mfg. Co.*, 10 East Broadway, Cuyahoga Falls 25, Ohio. Utilizing a multiple leverage principle, the chuck provides a positive vise-like grip on material. The control level requires only finger tip pressure for actuation. Chuck capacity permits the use of bar stock up to full diameter of spindle bore. Chucks are available in two sizes: The 1-in. capacity chuck fits lathes having a $1\frac{1}{2}$-in. eight-threaded nose spindle, and the 2-in. capacity model can be fitted to any lathe spindle up to $3\frac{3}{8}$-in. in size.

### Pneumatic Tools

PNEUMATIC tools, known as the Stream-Power line, have been introduced by *Buckeye Tools Corp.*, Dayton 1. The line comprises horizontal grinders ranging in speed from 3000 to 22,000 rpm, with capacities from $\frac{1}{2}$ to 8 in. diam; vertical grinders and sanders having speeds from 3000 to 6000 rpm, grinding wheel capacities from 4 to 6 in. diam, and sanding pad capacities from 5 to 9 in. diam; shears weighing from 3 to 6 lb, with up to 14 gage maximum capacity; nibblers for up to 20 gage maximum capacity; air wrenches with up to $\frac{5}{8}$ in. nut capacities; and reversible drills and screw drivers with up to $\frac{3}{8}$-in. drill and $\frac{1}{4}$-in. screwdriver max. The tools are compact in size, feature quiet operation, new governor control, increased power, direct air flow and ease of lubrication. Construction features include neoprene valve seals, oil-bearing end plates, magnesium alloy castings, tru-arc retaining rings and self-locking drive pins.

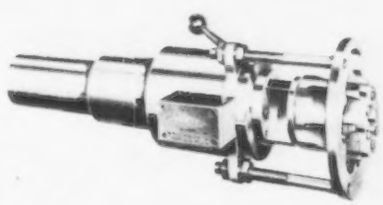
### Circular Turning Tool

FOUR cutting edges for turning and single chamfering operations are presented by a new cir-

cular-shaped carbide-tipped tool announced by *R. F. Cook Mfg. Co.*, Cuyahoga Falls 24, Ohio. The four cutting edges of the tool can be used before resharpening, a feature that tends to reduce machine downtime. The cutter can be used on any type of automatic single point turning machine, according to the manufacturer.

### Collapsible Pipe Taps

AN improved tap, the Style LL receding chaser collapsible tap, for tapping tapered threads, has been developed by *Landis Machine Co.*, Waynesboro, Pa. Taps are adjustable for thread length and can be used for American tapered pipe threads or for any line pipe, tubing, casing, or drill pipe threads, listed in the A.P.I. standards, providing threads are within the diametrical capacity of the taps. All operating parts are made of steel. The re-



ceding action of the chasers is accomplished through a fulcrumed lever principle. The collapsing action of the tap causes the chasers to drop into the tap head, at the completion of the thread, thus freeing the chasers from the work and permitting the direct removal of

the tap without backing out. The detachable head permits the use of tap heads of various sizes and capacities on the same tap body. Style LL taps may be used as stationary or rotary taps. The tap body is made in four sizes to cover a range of nominal pipe sizes from 1 to 12 in.

### Quick Soldered Coupling

FOR use where temperatures not to exceed 300°F are involved, a quick soldered coupling has been added to the standard line of bronze seamless flexible metal hose manufactured by *Brockway Co.*, Naugatuck, Conn. The coupling is a two-piece male coupling including a male body and a loose collar. The collar is so designed that when the hose is cut, it holds the braid tight, preventing unraveling and sliping; thus producing a hose and braid end automatically prepared for soldering. When soldered to the body coupling, it becomes one solid unit. The coupling protects and supports the hose at the most vulnerable point, eliminating need for reinforcement. Couplings are available separately, or in lots of 24.

### Porcelain Enamel Opacifier

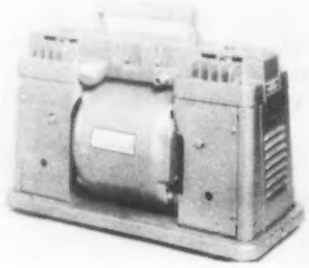
A ZIRCONIA base opacifier for porcelain enamels has been marketed by *Rohm & Haas Co.*, 220 W. Washington Sq., Philadelphia 5. Known as Lufax 77A, the product contains a mixture of controlled crystalline phases of zirconia, which, in addition to imparting opacity, provide nuclei for the crystallization of zirconia from the molten enamel. Gloss and opacity remain constant over a wide firing range and color is stabilized in the desirable blue quadrant. The opacifier is designed for zirconia opaque enamels.

### Scaling Hammer

FOR removal of weld spatter and excess metal, peening, beading, removal of rust, scale, paint, and for corebreaking in small castings, a high-speed scaling hammer, called the Master Model M-205, is available from *Master Pneumatic Tool Co., Inc.*, Orwell, Ohio. Features embodied in the tool are lightweight, low air consumption, and easy feathering of the throttle control in both lever and push-type throttles. Sure-grip body contour permits operator to better control his work. A positive locking device keeps valve mechanism sealed against leakage and dirt.

### Air Compressors

TWO portable fractional-horsepower air compressors have been announced by *American Brake Shoe Co.'s Kellog Div*, 230 Park Ave., New York 17. Special designing eliminates all contact or con-



tamination of the air with lubricating oil. Both compressors are adjustable for different pressures. Model 17-C, illustrated, delivers 4.4 cfm free air at 40 lb pressure and is powered with a ½-hp electric motor. Sealed ball bearings eliminate lubrication and the danger of burned-out bearings. The entire mechanism is encased in welded steel frames. Model 8-C delivers 2.2 cfm at 25 lb pressure. It is powered with a ¼-hp electric motor. Equipped with a single air cleaner, this model has no cylinders, pistons, or rings to wear out. A force feed oil system assures positive lubrication.

### Inclined Conveyer

FOR moving parts and materials from floor to floor, a new conveyer designed by *Sage Equipment*

*Co.*, 30 Essex St., Buffalo 13, can be installed in a couple of hours. The conveyer belts range in width from 8 to 24 in. to accommodate materials of varying sizes, and are made of 3-ply, 28 oz rubber-covered duck. The unit features slider-bed construction complete with nosed-over delivery and a power-driven tail feeder, and a gear head motor is furnished with the conveyer.

### Acid Dip Agent

FOR use in acid dips, such as hydrochloric or sulfuric acid, prior to plating, a new additive called Actane has been developed by *Enthone, Inc.*, Dept. 1A, New Haven, Conn. Its function is to disperse and remove colloidal films from the surface of metals that may be deposited during cleaning and which cause the plate to be spotted, streaked, or stained. Actane keeps the acid dips used in all plating cycles clearer and makes rinsing easier. The advantages of Actane are most marked for bright nickel plating.

### Burn Ointment

AN ointment for burns which gives quick relief of pain and muscular constriction has been marketed by *Pharmaceutical Preparations, Inc.*, 11 Niagara St. Bldg., Buffalo. Burned surfaces require no bandaging. Healing is rapid and all types of burns respond equally well, including those caused by hydrofluoric and chromic acids. The treatment is applied directly to the injured area and massaged lightly to insure proper penetration. Pain subsides in a matter of seconds, it is claimed, after which the surplus ointment is wiped off and the treatment is complete.

### Cutting Oil

AS a coolant and lubricant for all types of ferrous and nonferrous metals, a cutting fluid, announced by *Metal-Clean Solvent Corp.*, 1935 N. Paulina St., Chicago, incorporates superfatted materials compounded under laboratory control, and offers cooling, lubricating, wetting, and rust prevention properties. The product, called Metal-Clean No. 16, possesses adhesive quality which prevents chip clinging and insures longer tool life and better finish. Metal-Clean No. 16 will not separate out of solution; and at high speeds will not foam, gum, or suspend foreign matter, it is reported.

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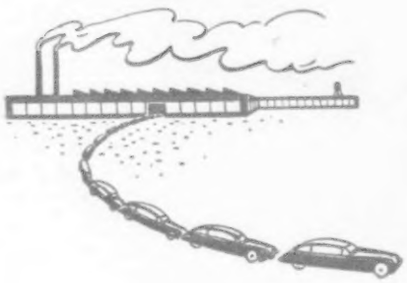
# Assembly Line . . .

WALTER G. PATTON

**• Lincoln-Mercury plant at Metuchen now producing more than 200 cars per day . . . GM settlement may set pattern for industry.**



METUCHEN, N. J.—After 2 months' operation, Ford has pushed its daily assembly rate at its new $10 million plant here over the 200 mark.

This new 585,000 sq ft plant just outside of New Brunswick was 2 years building and is one of three new Lincoln - Mercury assembly plants. In addition to the Metuchen plant, new Lincoln-Mercury assembly units are located at St. Louis and Los Angeles. The West Coast plant was officially opened a few weeks ago and dedication of the Metuchen plant will take place during June. The largest of the new Lincoln - Mercury assembly plants at St. Louis is also producing cars.

This is the first time Ford has ever assembled Lincoln cars outside Detroit. Some Mercury units were previously assembled at Edgewater, N. J. With the transfer of this operation to Metuchen, Ford's Edgewater plant will concentrate on Ford assembly exclusively.

There have been many obstacles to overcome in setting up the new operation. At the present time, construction work is still going on in the plant. As in the case of all new model cars, there have been minor problems in assemblying the new models. Also, as is true of all auto assembly plants nowadays, it has been extremely difficult to maintain satisfactory stock balances. Metuchen has been forced to use air freight regularly, according to plant officials, in order to maintain continuous operation.

One of the most difficult problems facing the management here has been the establishment of a smooth working organization. Less than 5 pct of the workers at the Metuchen plant were transferred from other Ford branches. Few of the workers have had previous experience in assembly line operations. Turnover has been unusually high. However, according to plant executives, the situation is improving and in another 6 months a smooth working organization so necessary for efficient operation of an auto assembly plant should be built up.

R. J. Neville, who previously served at Ford's Atlanta and Edgewater plants, is plant manager. C. L. Thorn is assistant superintendent.

Work on this one-story building designed by Albert Kahn Associated Architects, Detroit, was started Mar. 26, 1946. All material is delivered to the west side of the building and is moved either by conveyer or truck to the assembly line on the opposite side. Engines, body stampings and frames are shipped in from Detroit. A number of parts, including tires and batteries, are purchased in this area.

Body stampings are hung from hooks suspended from an overhead conveyer. Workmen remove the stampings from the hooks and move them to the assembly line. At frequent intervals the entire stock line is moved up to the start of the line.

The latest type 800 ft assembly line conveyer is used. A well-lighted pit facilitates operations on the underside of the body.

A DEPARTURE from previous assembly line practice is the use of a merry-go-round assembly line for the fender-radiator-grille assembly which is added to the car as a single unit. The Lincoln-Mercury cars are also designed to eliminate a considerable amount of soldering of the rear quarter panels.

At Metuchen, the bodies move through the paint booth in a sideways position. Down-draft type paint booths are used.

Lincoln and Mercurys are assembled on the same line here. A telautograph system is used to control the movement of parts toward the assembly line. At the present time, the Lincoln Cosmopolitan is assembled only at Detroit.

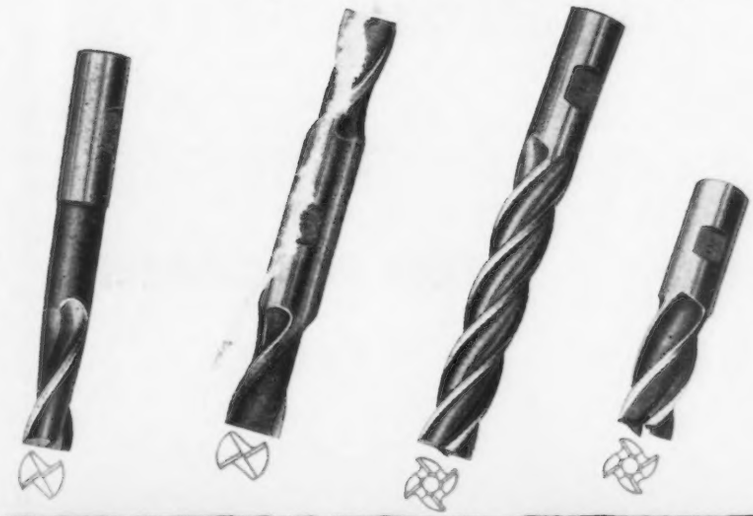
One thing that impresses a visitor to this modern auto assembly plant is the number of parts in a modern American car. It is quite a surprise, for example, to find that a Lincoln front fender subassembly is made up of ten separate parts. The steering gear, including the stabilizer, requires the assembly of at least seven different components, excluding nuts, bolts and fittings. The new type spring suspension used on the Lincoln-Mercury models appears to have at least a dozen individual parts. In the case of the Lincoln-Mercury cars, there are two universal joints, a design feature that is necessary to minimize the tunnel in the floor of the car. (The new Hudson also uses two universal joints.)

As one engineer recently put it, "When we find out how to build cars with fewer parts we will be able to build our cars a lot cheaper." He emphasized the fact that making the cars lighter is not nearly so important from a cost standpoint as making cars with fewer parts. A corollary to this observation is that many of the additional parts being added to cars are designed to give improved riding qualities.

The new Metuchen assembly plant has an excellent cafeteria. The building is heated by a forced air system and will use circulated air for cooling in the summer. The medical department includes an operating room and a hospital unit with four beds.

There is a test track adjacent to the plant where completed cars are given a short test run before being loaded on drive-aways for distribu-

# If you use fast-spiral end mills, you'll want to try "Hi-Helix"



"Hi-Helix" End Mill at work in General Electric's Plastics Division, milling mold for radio cabinets.

If your plant has discovered the many advantages of using fast-spiral end mills to cut intricate slots, pockets and keyways, you'll get *even better results* when you switch to "Hi-Helix" End Mills, Pratt & Whitney's improvement on the ordinary fast-spiral cutter.

Drawing on its long experience in the design and manufacture of precision tools, Pratt & Whitney has endowed "Hi-Helix" End Mills with special properties that make them cut cleaner, *longer*. Because such tools work continuously at the highest feeds and speeds, "Hi-Helix" End Mills are made only of high quality high-speed steel, hardened for maximum performance under any conditions. *And an exclusive P&W surface-treatment keeps "Hi-Helix" spirals from loading up or galling . . . keeps cutting edges always clear of chips . . . increases wear-resistance.*

Available in single-end or double-end styles, in both regular and two-lipped types, and in a complete range of sizes, "Hi-Helix" End Mills reduce over-all costs on the most intricate milling . . . deliver finishes so fine that hand-work is drastically minimized. It will pay you to investigate. For free descriptive booklet, write

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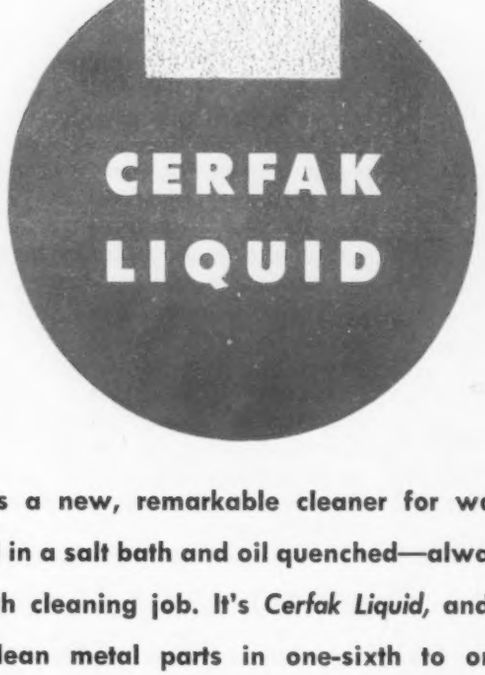
# Better, faster metal cleaning with these 2 Houghton aids:

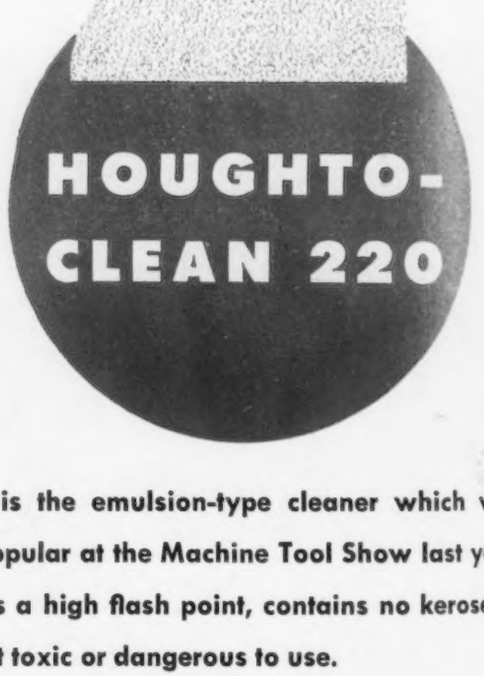
## 1 FOR OIL-QUENCHED WORK




Here is a new, remarkable cleaner for work treated in a salt bath and oil quenched—always a tough cleaning job. It's *Cerfak Liquid,* and it will clean metal parts in one-sixth to one-tenth the time formerly required in an old-style alkaline cleaning bath.

No hand brushing, no long soaks, and no expensive equipment required. Just heat a 1-to-75 solution to 180-200° F., and run the work through it. You'll be pleased at the amazing results, just as so many others have been.

## 2 FOR MACHINED WORK




This is the emulsion-type cleaner which was so popular at the Machine Tool Show last year. It has a high flash point, contains no kerosene, is not toxic or dangerous to use.

For cleaning oily parts in either still tanks or spray-type washers, you'll find *Houghto-Clean* 220 an outstanding value. It leaves a very slight film which aids in protection against rust, and which need not be removed before applying a final rust preventive. It does not attack the metal. Why not try it now, in your shop?

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tion in the seaboard states served by the Metuchen Lincoln-Mercury unit.

A service school where dealers and mechanics can be trained is also included in the new Metuchen plant.

DETROIT—With the settlement of the General Motors-UAW-CIO wage tug-of-war the auto industry has bounded back from the abyss of uncertainty and despair to buoyant optimism. While it is still too early to predict the extent to which the GM wage agreement will be followed by other auto builders, it seems reasonable to believe that auto producers, both large and small, will seize on the GM type agreement as a means of resolving many of their present differences with union representatives.

Already there are indications that a Chrysler settlement will be reached in the near future and at least one trade association has indicated that the GM formula looks like a satisfactory basis for resolving a wage controversy that was badly stalemated.

Agreement between the union and GM was reached after 44 bargaining sessions which started out with 15 representatives on each side of the table. Last Friday it was agreed to reduce the number of participants to four on each side of the table. Intensive bargaining was continued through Saturday and Sunday. Early Monday there were definite indications that agreement was near. The final session started at 1 P.M. with only two representatives on each side and the settlement was announced at 6:30 A.M. on Tuesday morning.

Probably the most important aspect of the new agreement is the GM basic proposal which led to resolution of difference between GM and the union at a time when there were strong indications that agreement could hardly be reached in the few days remaining until the GM contract expired. Specifically, GM proposed:

(1) To re-establish the buying power of an hour of work on a fair basis, i. e. making up in full what the worker has lost in purchasing power since the war.

(2) Protect the buying power of an hour of work against future changes in consumer prices.

(3) Improve the buying power of an hour of work for GM employees so that over the years the worker is assured of an improved standard of living.

(4) Stabilize relations between management and labor over a substantial period of time.

Proceeding from this agreement as to desired long-range objectives, the union and GM reached final agreement on a wage adjustment plan which has the following features:

(1) The cost of living adjustment has been determined at 8¢ an hr to make up the difference between workers post-war wage increases and the rise in the cost of living index since 1940.

(2) An annual improvement factor to cover the increased standard of living will be 3¢ per hr.

(3) Quarterly adjustments in the cost of living factor will be made.

(4) All wage and contract provisions will be stabilized for 2 years under the new agreeemnt.

Under the terms of the new contract, GM places a floor under the wage rate but there is no wage ceiling. Thus, if the cost of living should fall it is specifically agreed that only 5¢ of the 8¢ will be subject to reduction. There is no limit to what advances may be required by increased cost of living.

The first quarterly cost of living readjustment will be made in the first pay period starting after Sept. 1, 1948.

An employee earning $1.50 per hr today will be raised immediately to $1.61 per hr of which 8¢ is the cost-of-living factor and 3¢ the annual improvement factor.

The far reaching nature of the new agreement is seen from the fact that it resolves all outstanding economic differences between GM and the union. At the time bargaining was started the union was asking that 132 paragraphs of the 154 paragraph agreement with GM should be changed. In addition to a 15¢ wage boost, the union was asking for pensions, a social security fund, increases vacation and the union shop. In other words the union was asking for an entirely new contract—which was what it got in the form of a surprise wage package that contains the first cost-of-living adjustment plan ever offered by a major auto manufacturer.

A voluntary written agreement on union security provides for a voluntary checkoff of dues.

The union has agreed to drop its NLRB petition for union shop elections.

On the matter of social security and pension programs, if and when a legal determination of the proposed program is made, both sides will set up study committees. The union is prohibited from demanding additional compensation for such programs during the life of the agreement.

General Motors has estimated that the cost of the new wage agreement in the first year will be approximately $75 million. A union spokesman has estimated that application of the GM wage formula to 1 million UAW-CIO workers would mean an addition to their annual income of at least $220 million.

In the final hours of the exhaustive bargaining sessions the bargaining committees were reduced to two men on each side. In these sessions, GM was represented by Harry W. Anderson, vice-president in charge of personnel, and Louis G. Seaton, director of industrial relations. T. Arthur Johnstone, assistant director of the GM department, and John Livingston represented the union.

Meanwhile, there was considerable speculation here as to the individual largely responsible for devising the formula that worked as successfully in resolving what appeared to be an impasse in the current negotiations. While it is quite possible that many individuals had a hand in working out the final formula, sources close to the negotiations are crediting C. E. Wilson, president of GM with suggesting the basic formula which was used in arriving at a final settlement.

It seemed clear to most Detroit observers that the new GM formula and its variants that will undoubtedly follow in short order had set for the automotive industry the most reasonable and equitable wage pattern that has yet turned up in the motor industry. Many observers were willing to predict that large segments of the industry, including steel and other heavy industries, might eventually arrive at a wage formula that will offer the workers some if not most of the advantages incorporated in the new GM-UAW-CIO contract.

# Washington . . .

EUGENE J. HARDY

**• Steel industry meets with Munitions Board . . . Defense studies accelerated . . . Capacity problem high on list . . . Long-range study planned.**

WASHINGTON — The nation's iron and steel industry has been handed a number of additional assignments by the Munitions Board in connection with nati nal defense planning. The more pressing problems were tossed at the Iron and Steel Advisory Committee at a meeting on June 3. The first job of the recently formed committee, of course, is to complete its organization. It is tentatively proposed by the Board to breakdown the whole committee into at least six subcommittees or working groups. Each subcommittee would direct its attention to a specific and definite field within the industry. The varied phases of steelmaking represented in the committee's membership lends itself readily to such organization.

Subject to committee approval, the Board proposes initially that a subcommittee be assigned to each of the following fields: Raw materials (including scrap), semi-finished mill products, finished mill products, forgings and castings, armor plate, and tool-alloy-stainless steels.

A decision which must be made by the Board and the Steel Committee is whether it will include within its scope the handling of problems pertaining to the foundries industry or if a separate Foundry Advisory Committee should be set up to take care of such matters.

CHIEF among the problems which the Board laid before the Committee is a determination of current and potential capacity of the industry as viewed from the standpoint of emergency conditions (THE IRON AGE, Apr. 15, 1948, p. 104).

The Board is concerned only indirectly with the current controversies over whether existing and planned new capacity is sufficient to meet future peacetime requirements. Steel, as a commodity, is not a stockpiling item. The Board is concerned, however, about the probability of adequate military supply should an emergency develop; upon the Board rests the basic responsibility for having a mobilization plan ready to put into effect at any given time.

Should the Board and its advisory committee conclude that current production is sufficient for peacetime requirements but not enough for both domestic and military demands during an emergency, solution must be found for a two-fold problem. Would it be more feasible to plan for severe restriction of less essential uses of steel or to embark upon a capacity expansion program immediately at a time when materials and manpower could least be spared

Prior to and during the early days of the late war, steel capacity was believed to be adequate for all needs. It was eventually necessary for the government to embark upon a $10 billion program which added to production by about 10 million tons.

Present capacity is generally estimated at around 94 million ingot tons. New capacity scheduled through 1949 is figured to add another 2 million tons to this total. On a short range basis, steel is still short in this country but in view of slow reconstruction of foreign production facilities, presumably in an emergency the United States would also be called upon to furnish steel needed by any ally.

SHOULD subsequent studies by the Boaord and the advisory group indicate that potential production would fall short of mobilization demands by, say 10 million tons, a plan would have to be worked out which would provide a method or combination of methods for obtaining the needed material.

However, by advance planning for complete utilization of existing facilities, the Board aims to hold to a minimum any emergency need for construction of new facilities. It has already set in motion a survey of steel and other manufacturing capacity and facilities (THE IRON AGE, Apr. 15, 1948, p. 122) which could be used or converted to war production.

In the reconversion scramble and postwar hurry to disarm, many special purpose plants, newly constructed or converted from peacetime production, were dismantled or reconverted. One example is armor plate for which the nation's production potential is now unknown except in a general way.

Remedy of this matter is one of the first jobs the steel advisory group will be asked to undertake. The Board wants to know specifically what production facilities for rolled, forged and cast armor are still existent, what the productive capacity is in each category, and what transportation problems must be planned for between factory, heat-treating plants, and point of consumption.

ALSO in connection with the capacity picture, the Board and the advisory group will plan for thorough study of all other means of boosting production. This will include use of oxygen in furnace production and similar processes.

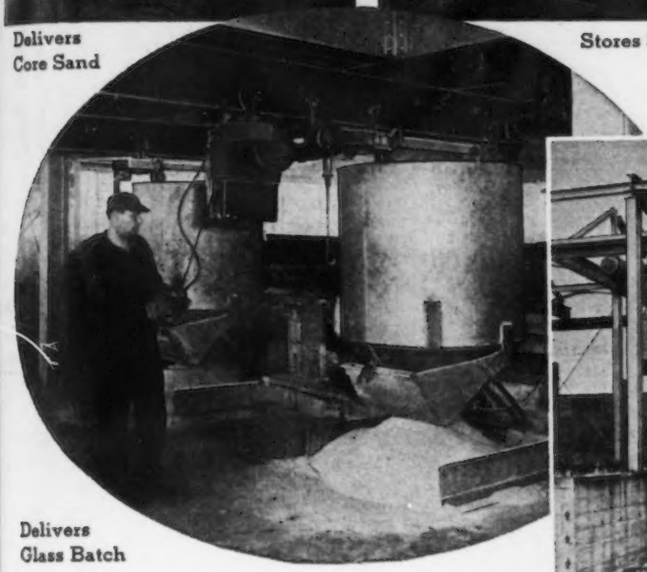
The Committee will be asked to make a thorough study and report on alloying elements. The Board is seeking all possible information and data, for instance, on electrolytic manganese—the types of steel in which this material could be utilized (regardless of cost), what quantities would be needed, and how much could be supplied.

Also to be taken into considera-

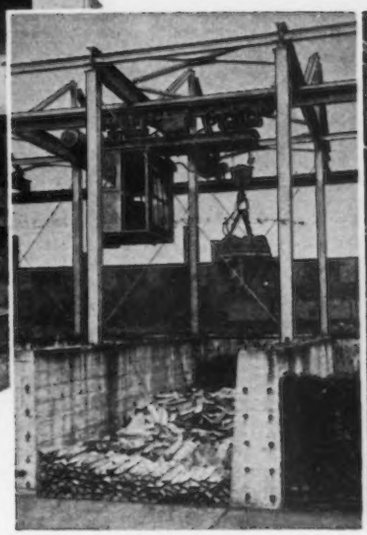
Delivers
Core Sand

Stores Sheet Steel

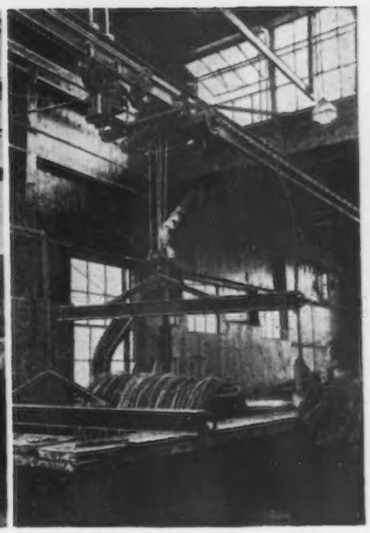
# MONOTRACTORS Do the Hard Jobs



Delivers
Glass Batch



Stores Pig Iron



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tion is the matter of development of beneficiation processes for low grade ores and development of new ore reserves against the day when present high grade beds will be worked out. Both the Munitions Board and the National Security Resources Board have a keen interest in development of new ore reserves since this may involve new plant location. Present thinking now leans more toward dispersal of plants and factories than taking them underground.

Groundwork will likewise be laid at this meeting for study of other related problems such as the metallurgical coke situation and conversion problems relating to mill products other than armor. All in all, time is not likely to hang heavily on the hands of the members of the Steel Committee.

## DuMont Laboratories Buy Wright Plant From WAA

*Washington*

• • • **Allen B. DuMont** Laboratories, Inc., has purchased the Wright Aeronautical Corp. plant at East Patterson, N. J., for $1,700,000, according to War Assets Administration.

The principal manufacturing building of the plant, formerly used for the production of aircraft engines, is approximately 570 ft wide and 760 ft long. Other buildings include a substation, fire pump house, guard house, gasoline storage building and a field office. The plant occupies a land area of 56 acres. The purchaser, a manufacturer of television equipment, plans to employ approximately 1,000 persons in the plant.

The sale is subject to National Security Clause provisions that it will be maintained in such a manner that it may be reconverted to its original use within 120 days. It is subject also to an opinion by the Department of Justice that it is not violative of anti-trust laws.

## Colombian Steel Mill

*Washington*

• • • The International Bank for Reconstruction and Development has been requested by the Colombian Government to advise and assist in the selection of competent advisory and engineering services in the United States and, if possible, to make contact with investors, regarding a proposed steel mill in the Northwestern part of Colombia.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

IT'S GOT SO I HAVE TO HANG STUFF ON TH' BAR TO KEEP IT FROM CHATTERIN' AN' BORIN' OVAL HOLES!
THAT'S FINE! SOME MEN WOULDN'T KNOW WHAT TO DO FOR THAT--NICE WORK, AMBROSE!
THAT'S A DUMB WAY TO HINT FOR AN OVER-HAULIN' OR A NEW MACHINE-- MAKIN' IT WORK SOMEHOW! BELIEVE ME, THEY'LL LET YOU CONTINUE!
J.R.WILLIAMS
6-4
ENCOURAGEMENT
T. M. REG. U. S. PAT. OFF. COPR. 1948 BY NEA SERVICE, INC.

## New Steel Warehouse Will Handle French And Domestic Steel

*Linden, N. J.*

• • • **A new specialty** steel warehouse to handle French tool steels, and domestic alloy steel bars, stainless steel sheets and cold-finished carbon bars will open here about June 1. The company, Bowsteel Distributors Corp., is set up to import tool steels through the facilities of Cie Davum, Paris, a French steel warehousing company.

Bowsteel Distributors will market French tool steels made in the induction furnace at the same prices at which domestic steels are sold. The company will concentrate at first on three grades of tool steels, straight carbon, oil hardening, and high chromium-high carbon steel. Later some additional grades of French specialty steels such as invar and elinvar may be offered.

The domestic steels which the new warehouse will handle are to be supplied principally by Republic Steel Co. They include cold-finished carbon steel round bars and shafting from ¼ in. to 3 in., bessemer steel cutting stock in rounds and hexagons up to 2 in. diam, and hot-rolled and cold-drawn alloy steel bars in AISI 4130, 4140, 4340, 4615, 8620 and 8630. Stainless steel sheets will be offered in gages from 12 to 24 in AISI types 302, 316 and 347.

The plant, located on a six acre tract between Linden Ave. and the Pennsylvania Railroad main line, is now being completed by D. O. Evans of Hillside, N. J. At present the business is being conducted at 50 Clinton St., Newark 2, N. J., and the warehouse stocks are being held temporarily at Lindhurst, N. J.

The president of the company is E. A. Henault, who is also president and owner of Francosteel Corp., mill representative of French steel interests for the export of U. S. steel products abroad. Capital for Bowsteel Distributors Corp. has been advanced by the steel industry in France.

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# West Coast . . .

ROBERT T. REINHARDT

**• Salt Lake City to get $1 million pipe plant . . . Gas line users warned of staggering increase in demand . . . Trend to large diameter pipe . . . Poor steel supply prospects . . . Underground gas storage trend seen.**

SALT LAKE CITY—A million dollar steel pipe manufacturing plant will be constructed soon in Salt Lake City. Associated in the project are the Structural Steel & Forge Div. of EIMCO Corp., which is controlled by the Rosenblatt family, and L. J. Berkeley, owner and president of the Penn Tool & Machine Co. of Danville, Ill.

The plant will manufacture pipe in sizes of 10 to 33 in. for oil, gas, sewage and water lines, water and oil casing. It will rely on the Geneva Steel Co. plant for steel supply. The sponsors plan to market in the intermountain states of Utah, Idaho, Wyoming, Arizona, Nevada and western Colorado.

Morris Rosenblatt, president of Structural Steel & Forge Co., said a site has not been definitely selected but that several are under consideration. Actual construction is not expected to get under way for 6 to 8 months.

The new plant was prompted, Mr. Rosenblatt said, by the anticipated large demand for steel pipe for municipal water and sewage line installations and replacements, projected water developments, oil developments in the Rangely, Col., field and extensive oil explorations elsewhere in the region.

A contract for $450,000 worth of sewer vacuum filter units developed by EIMCO Corp. has been awarded to the firm by the city of Los Angeles. The filters, which represent a substantial portion of EIMCO's business, are self-contained units which separate the solids from the water, return water suitable for industrial purposes, and process the residue into dry commercial fertilizer.

The Kaiser-Frazer blast furnace at Ironton was blown in recently. The company's Sunnyside beehive coke ovens have been in production since the end of the coal strike. Both the furnace and coke ovens have been rehabilitated since the properties were purchased from War Assets Administration. The furnace has been christened "Mary" in honor of Henry J. Kaiser's mother.

For the next 5 years at least the far western market for steel will exceed western productive capacity, J. Lester Perry, president of Columbia Steel Co., said during a recent visit to the Geneva steel plant. The long-range outlook, he added, is more difficult to appraise, but he expressed confidence that after the accumulated demand for steel is met western productive capacity will not exceed the region's consumptive demand.

* * *

MONTEREY, CALIF.—A dismal picture of gas pipe line steel prospects in the face of staggering demand was painted here for members of the gas industry. G. Lawton Johnson, assistant general manager of sales, National Tube Co., Pittsburgh, declared that by 1952 the demand for gas would be almost double what it is today. Mr. Johnson spoke before the technical section of the Pacific Coast Gas Assn. here recently.

A study of the overall trends of the gas industry and their relationships to the supply and demand picture from the viewpoint of logistics makes it evident that the public utilities are faced with a disturbing situation, Mr. Johnson said. This comprises: (1) A present problem of insufficient facilities to meet present obligations, and (2) a realization that the problem is rapidly increasing in severity.

To meet this problem he disclosed that one Mid-West group of utility companies has adopted the practice of storing a 48-hr supply of natural gas under high pressure in batteries of big seamless steel tubes or "bottles" buried at a point convenient to a distribution plant. This emergency reserve has been found very helpful in making it possible for the utility to meet its obligation to maintain residential service at all times. The high pressure, bottle type of storage unit was selected after a careful study of all types of storage facilities now available, according to Mr. Johnson.

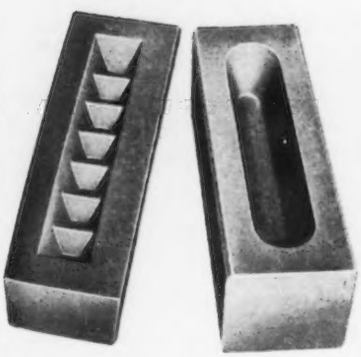
On the credit side, the tube company sales official reported a favorable balance indicated between present known natural gas reserves and yearly net consumption. As of Dec. 31, 1947, reserves had increased from 160 trillion to more than 165 trillon cu ft in spite of a record yearly consumption of over 5 trillion cu ft in 1947. Thus, not withstanding the large increase in consumption, estimated, proven, and recoverable reserves actually increased during 1947.

But the 1947 consumption represented an increase of some 14 pct over the 1946 figures, he reported. To maintain this ratio of increased reserves over increased production, further exploration and development are necessary. Although there is an indicated shortage of drilling equipment, principally drill pipe and casing, an estimated 3000 gas wells will be drilled in 1948. Pipe lines are in critical demand, and an additional capacity of the large producers will not be available for some time. The growth of the natural gas industry has been steady during the last 10 years and demand for pipe lines has increased tremendously since the war.

A surprising factor disclosed by the steel man was the trend to increased pipe diameters. This reflects directly on the availability and finishing capacity of the steel industry. The average tonnage per

# How to get CLEANER METAL

## USE "National" over-metal and pig molds!



Over-metal and pig molds made of "National" electric furnace graphite produce cleaner ingots faster and more economically. Graphite is immune to thermal shock, insoluble, not wet by molten metal, easy to machine, has high thermal conductivity, and lasts indefinitely. This means ingots chill rapidly, won't stick in the mold, are free from contamination and smooth in finish. No mold wash necessary. Quick chill cuts floor space and number of molds to the minimum.

## USE "National" fluxing tubes and pyrometer sheaths!

"National" graphite fluxing tubes, for purification of hot metals, give unusually long life and will not contaminate the metal. They are heavy-walled, easily threaded, will not fuse or dissolve, and are not attacked by Nitrogen, Chlorine, or the rare gases. Stocked in 2" OD by ½" ID by 2', 3', 4½', 6', and 9' lengths. "National" graphite thermocouple sheaths are similar in construction to the fluxing tubes, except that they are blind end. Both products possess all the advantages of pure electric furnace graphite.

## USE "National" skimmer floats!

"National" graphite skimmer floats prevent oxidation, hold back slag and dross, and will not contaminate the casting metal. They are fitted with a convenient lifting hole for easy handling and may be used over and over again. Made of pure electric furnace graphite—no foreign bond—these floats will not spall or crack. Stocked in diameters from 3" to 9" for use with crucibles #5 to #100 inclusive. "National" skimmer floats pay for themselves!

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mile of pipe line installed in 1946 was 171½ tons as compared with an average of 86 tons in 1938. The availability of material for additional pipe lines does not appear favorable for the immediate future, so other measures must be taken to help get enough gas at the right place at the right time.

In the years 1937 to 1941, 49 pct of the gas pipe lines were 12 in. and under, 19 pct were in the 14-in. to 18-in. group, and 30 pct in the 20-in. to 26-in. group. In 1946 the ratio had changed to 17 pct 12-in., 26 pct in the middle group, and the large diameters had increased from a mere 30 pct to 56 pct. The projected future figures, based on this trend and on present planned construction indicate that the first group has dropped to 3 pct, the middle group will be only 5 pct, and the large outside diameter group, 20 to 30-in. in size, has increased to 92½ pct, according to Mr. Johnson.

Based on tonnage the picture is even more serious, he asserted. During the 1937 to 1941 period the 12-in. and below group represented 29 pct of the tonnage, the 14 to 18-in. group 20 pct, and the 20-in. 50 pct. Construction during 1946 changed this ratio to 8 pct below 12-in., 20 pct in the middle group, and 73 pct in the 20 to 30-in. range. Again looking at this projected and planned construction for the 1947 to 1951 period, sizes below 12 in. are only 1 pct of the tonnage, the 14 to 18-in. group is 3 pct, and 96 pct of the total tonnage will be in the large diameter sizes, from 20 to 30 in.

This change in both outside diameter size and tons per mile explains in part the current inability of the steel industry to meet the steel pipe line demand. Most of the major producers today cannot accept additional pipe line commitments for delivery before 1953, Mr. Johnson said.

Mr. Johnson described a 40 million cu ft underground gas storage installation, built in Chicago in lieu of a conventional vertical gas holder.

The cost of this installation was in the order of $45 per thousand cu ft of gas storage capacity for the field, he revealed. He added that total cost including the compressor and sent-out station, land, engineering, and other items, was about $60 per thousand cu ft of capacity. When the ultimate storage of 70 million cu ft is installed at this site, it is anticipated that the average cost per thousand cu ft will be reduced to approximately $55.

While there have been no conventional type gas holders constructed in this rear recently, our best estimate is that the cost of such holders today would be in the order of three to five times the cost of high pressure storage in buried pipe sections.

This type of storage has many advantages where it is applicable. Obviously, a considerable part of the favorable economics is incident to the supercompressibility of natural gas. Likewise, suitable land must be available at reasonable prices. About 75 to 80 million cu ft of storage can be installed on 160 acres. The relative appearance and the freedom from above-ground hazards are advantageous. Also, we are in the early stages of a development and are finding opportunities for lowering costs and improving flexibility of design which undoubtedly will lead to further advantages.

* * *

*WESTERN STEEL: An overhead crane operator is lifting a 90-ton ladle of molten steel, as an open-hearth is tapped in U.S. Steel's Columbia plant at Pittsburg, Calif. Other employees will pour it into ingot molds. Slag which floated off is forming interesting crust formations in the two pots below.*

* * *

## Canadian Cos. Making Diesel-Electric Engines

*Montreal*

• • • **Two Canadian firms** now are manufacturing Diesel-electric locomotives in Canada, and Canadian General Electric Co., largest manufacturers of electrical products in Canada, have joined forces to produce in this country this newest form of railway motive power.

H. M. Turner, president of Canadian General Electric, and Sir Frederick Carson, executive vice-president of Montreal Locomotive Works, announced completion of a trade agreement. Montreal Locomotive Works will manufacture the locomotives, while Canadian General Electric will supply the electrical equipment.

The first locomotive to be produced under this arrangement will be a 1000 hp, Diesel-electric, which will be exhibited at the Canadian International Trade Fair in Toronto from May 31 to June 12, and then it will be delivered to the Canadian Pacific Ry. as the first unit of the first order of the joint companies' efforts.

At the present time, Montreal Locomotive Works, is building three different types of steam engines for the CPR. Recently it completed an order for 20 locomotives for Egypt, and the company has orders from Portugal, East Africa, Newfoundland and India. The India order is for 90 steam locomotives and 10 boilers, all to be finished this year.

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# PERSONALS

o o o

• **C. T. Spivey** has been appointed director for industrial relations for Columbia Steel Co. to succeed **Joseph L. Turner** who has been promoted to an executive position with the U. S. Steel Corp. of Delaware at Pittsburgh. Mr. Spivey will make his headquarters in the San Francisco office of Columbia. **Robert R. Wolfenden** has been appointed product manager for tin mill output; **R. E. Smice** has a similar position for heavy products; and **W. M. Jarrard** has been made products manager for wire mills, all of Columbia Steel Co. at Pittsburg, Calif. Mr. Jarrard replaces **Robert C. Baker** who has retired after 43 years of service with the U. S. Steel Corp. and its subsidiaries. **Joseph A. Burgard** has been appointed to the position of technical sales representative for the general sales department of Columbia Steel Co., San Francisco.

• **Charles R. Barton,** vice-president in charge of manufacturing for the National Supply Co., Pittsburgh, has retired after 30 years of service. **F. W. Bremmer** has been named works manager of the Ambridge plant of National Supply, succeeding **W. M. Frame,** who has resigned. **Harold R. Beachler** has been appointed works manager of the company's Etna plant, replacing Mr. Bremmer there. Mr. Beachler has been superintendent of the lapweld mills at Etna.

• **William T. Ennor** has been named an assistant director of research for the aluminum research laboratories of Aluminum Co. of America, Pittsburgh. He joined Alcoa in 1924, and since 1945 has been general staff metallurgist for the fabricating division.

• **Eugene D. Bishop** has joined the mining division of Firth Sterling Steel & Carbide Corp., McKeesport, Pa., as special representative in the development and sale of rock bits. He will make his headquarters in Boulder, Col. Mr. Bishop came to Firth Sterling from Canastota, N. Y., where he was general superintendent of Worlock Stone Co.

• **Dr. Warren S. Peterson** has been selected to supervise the physical metallurgy laboratory of the new aluminum research department at the Permanente Metals Corp. Trentwood rolling mill near Spokane. Dr. Peterson was formerly assistant project supervisor for the research department of the Air Reduction Sales Co.

R. L. CUNNINGHAM, president, Ohio Ferro-Alloys Corp.

• **R. L. Cunningham** has been elected president of the Ohio Ferro-Alloys Corp., Canton, Ohio. Mr. Cunningham has been an officer of the corporation since 1941, most recently serving as executive vice-president. He is also a director of the corporation. **W. W. Pritz** has been elected executive vice-president. Mr. Pritz has been with Ohio Ferro-Alloys since 1939, having held the positions of works manager and vice-president. He is also a director. **W. O. Wetherell** has beeen elected secretary and treasurer, succeeding **H. G. Paisley,** who has retired. Mr. Wetherell has been with the corporation since 1935, having served as traffic manager and purchasing agent.

• **Lawrence J. Kauffman,** scrap purchasing agent at the Pittsburgh plant of the Federated Metals Div., American Smelting & Refining Co., has been promoted to assistant manager of operations at Houston. **Nathan J. Muskin** succeeds Mr. Kauffman as scrap purchasing agent at Pittsburgh.

• **Dr. D. P. Morgan** has joined the Mathieson Chemical Corp., New York, as administrator of research and development. For the past 2 years he has been with W. R. Grace & Co. in New York in charge of chemical market research and development.

• **Luke E. Sawyer** has been elected executive vice-president and a director of the Babcock & Wilcox Tube Co., New York. Mr. Sawyer takes over the major management responsibilities in the company following the recent death of Peter D. White, former president. Paul J. **Utnehmer** has been named works manager in charge of manufacturing at the Beaver Falls, Pa. and Alliance, Ohio plants of the company, and **E. A. Livingstone,** vice-president of the Tube Co., has been elected to the board of directors. **Alfred Iddles,** president of the Babcock & Wilcox Co., the parent organization, has also been elected president of the Tube Co.

• **O. J. Fister** has been named assistant to the vice-president of Oil Well Supply Co., Oil City, Pa. Mr. Fister has been with U. S. Steel since 1935, starting with Federal Shipbuilding & Dry Dock Co. He has been assistant manager of industrial relations at Federal since 1943.

• **Edward R. Hall** has been promoted to vice-president and assistant general manager, shops division, Baltimore, of Koppers Co., Inc., Pittsburgh. He had been vice-president and works manager of the division which operates the Bartlett Hayward plant at Baltimore. **Arthur C. Thompson,** general superintendent, has been made works manager.

• **Louis W. Hesse** has been appointed director of community relations for the Keystone Steel & Wire Co., Peoria, Ill. He joined the company 10 years ago.

• **James A. Trainor,** comptroller of Commercial Controls and Electromode Corps., Rochester, N. Y., has been elected vice-president and a director of the two firms.

• **Louis E. Feisner** has been appointed superintendent of mechanical maintenance, universal, hot and cold strip mill department, Midland Works, Crucible Steel Co. of America, Pittsburgh. He was previously with Braeburn Alloy Steel Corp. **Edgar M. D. Herold** has been named assistant superintendent of finishing mills, Midland Works of Crucible Steel. Mr. Herold was formerly at the Duquesne Works of Carnegie-Illinois Steel Corp.

(CONTINUED ON PAGE 144)

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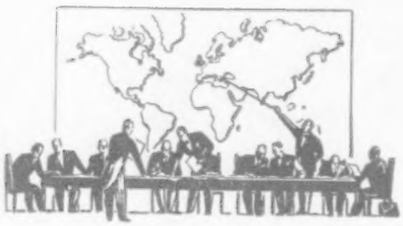
# European Letter . .

**• Labor Party faced with hard truths . . . Must form program to please public opinion rather than satisfy own desires in order to win general election.**



LONDON—Mr. Herbert Morrison has always been the longest-sighted of the leaders of the Labor Party, and has been striving at Scarborough to bring the Party Conference to a sense of realities. He has told the Party such hard truths as that their margin of votes is slender, that they will have the fight of their lives to win the general election, that they must draw up their program to please public opinion rather than to satisfy their own desires and that there is more need to make the existing schemes of nationalization work well than to initiate new ones. To judge by reports from Scarborough, the Lord President had only moderate success with this line of argument. Perhaps nothing else could be expected. Party conferences are peculiar occasions. The people who really matter to the Labor Party were not represented at Scarborough—except perhaps by Mr. Morrison.

Observers report that this is a dull conference. The first exhilaration of power has passed and the excitements of the election are still too far off. The truth is that the Labor government, in an electoral sense, is not doing too badly and not doing too well either. It has lost no by-elections—but the figures of votes cast, as well as the public opinion polls, suggest that it has lost the essential margin. It is Mr. Morrison's instinct to do as little as possible that is new or startling in the coming 2 years because he believes that the Labor government has already done too much, rather than too little, for the taste of the crucial marginal voter.

There have been some notable converts within the Labor Party of recent months to this view that an effort must be made to please, or at least not to frighten, the unattached middle-class voter who put Labor in in 1945. The country has even been treated to the strange spectacle of the organ of the Socialist intellectuals advocating such things as the restoration of incentives in industry, the removal of controls and the restoration to "the secondary industries" of "the greatest possible freedom"—all this in order to "regain the support of some at least of the professional and technical classes which have been alienated since 1945." But it is not yet by any means the view of the party. The crux of these differences of view lies in the blessed word nationalization. It is not merely the simple issue of whether there shall be more or less of it—though that is indeed a matter for dispute. What is of much greater importance is the fact, which has now become painfully clear, that the Labor Party is very far from being of one mind about what the purpose of its nationalization schemes should be.

THE orthodox view of nationalization is that it is a means of securing a much more efficient, scientifically planned, productive organization of industry. The justification for schemes of nationalization, says the latest statement of this view, "is that they are essential for a planned and expanding economy which stimulates true initiative and enterprise." Socialist planning should give "an assurance that, while serving the needs of society, it gives a chance for initiative, scientific research and modern management techniques."

*Reprinted from The London Economist by special permission.—Ed.*

In no case was this more true than of coal. A clear majority of the public was convinced, first, that there was an urgent need for a drastic reorganization of the coal mines, secondly, that this would not happen under private ownership, and thirdly, that nationalization opened up the way to greater efficiency. If the Coal Act had been submitted to a plebiscite, it would have been given a large majority, and for these reasons.

Now Sir Charles Reid has resigned and once again the event has a symbolism that is greater than its actual content warrants. The occasion of the break appears to have been matters of the Board's organization. But it looks as if the real cause was the resistance of the union to the necessary measures of technical reorganization — which everybody knew would be unpleasant—and the unwillingness of the Board to stick to its principles.

THERE are clearly two wholly different conceptions of the purpose for which industries are brought under public ownership, and both conceptions can be found within the Labor Party itself. The one conception of the purpose is that the nationalized industry shall better serve the interests of the nation. The other is that it shall better serve the interests of the men and women who work in it. In theory, the two conceptions are perhaps reconcilable, on the lines that it is only when the workers are content that real efficiency can be secured. But in practice they lead in opposite directions.

This confusion of purpose is not confined to the Labor Party. On the contrary, it runs all through contemporary British thought, and exactly the same conflict reproduces itself among the capitalists. On the one side there are those whose economic objective is a comfortable featherbed for all, whose only idea of economic policy is to concede to particular interests the right to protect themselves at the community's expense. On the other side there is the belief, which can be seen just as clearly in Socialist doctrine as in the theory of *laisser faire* liberalism, that the interests of the community transcend those of any of its parts.

The Labor Party will have to make its choice between these two doctrines. It can hardly, for much longer, ride both horses at once. Being a free agent, it can make its own choice.

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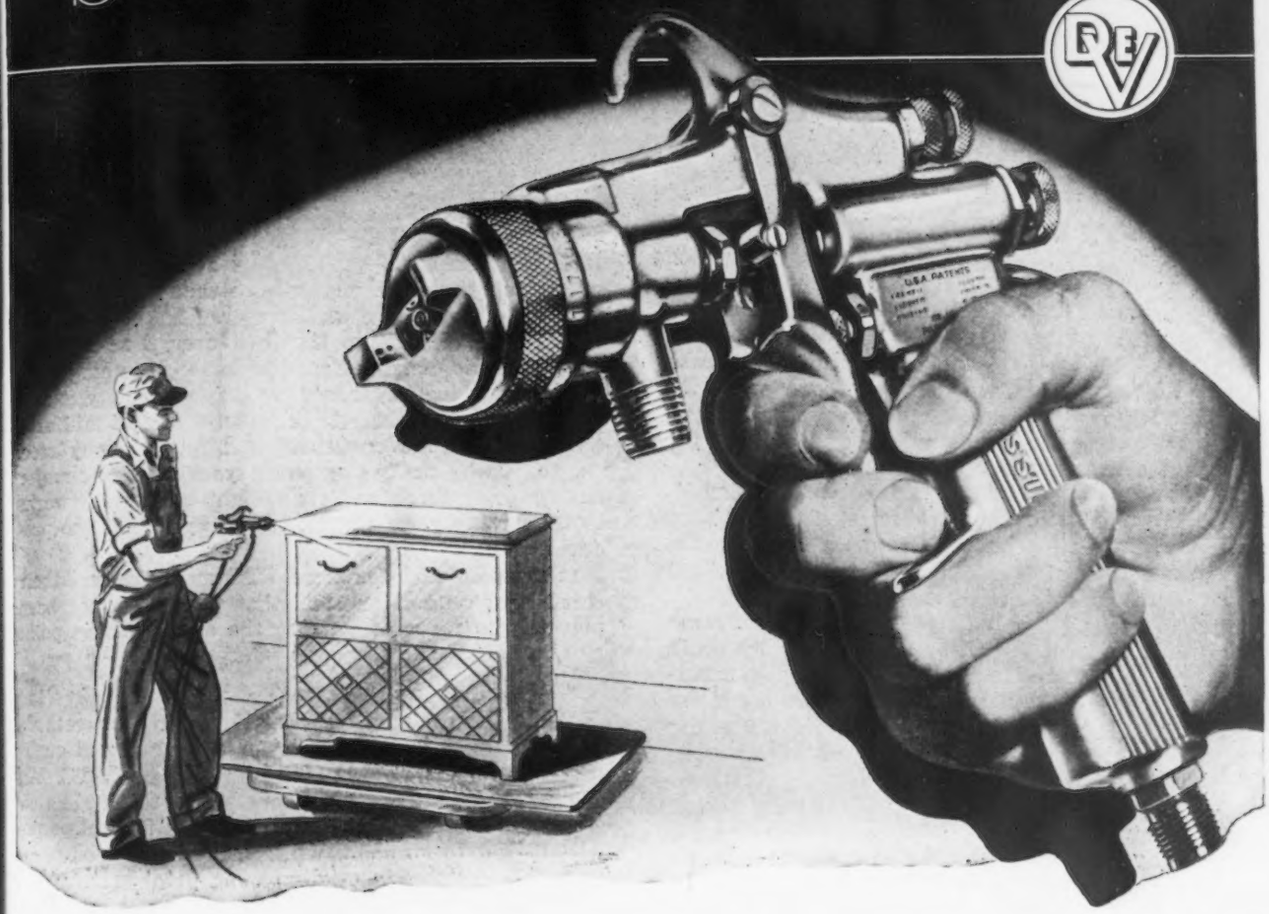

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# Industrial News Summary...

- **Basing Point Talks Rage**
- **Consumers Start to Worry**
- **GM Wage Pact Hits Steel**

MANY steel officials believe the only salvation for the basing point system in steel as now practiced is legislation. The Cement Decision is so plain in its wording about basing points that there is no hope in that quarter. Additional evidence in the past week indicates that no matter what the outcome of the present hearings of the Federal Trade Commission against steel, the industry will fight for retaining the present method of selling steel.

In some quarters it had been thought that a modified basing point system of selling steel might have resulted from FTC hearings and discussion but the specific character of the cement ruling and the rigid conduit case put that out of the picture.

Most steel officials feel that there have been some parts of the so-called basing point system which could naturally be eliminated. One of these has been phantom freight (charges not actually incurred). Many steel firms took action long ago to make sure that the freight costs charged to their customers are no more than actually incurred. Furthermore, in the past several years the trend has been towards more basing points instead of fewer.

One thing appears certain this week—the basing point question is now, and will be, the most important factor in steel discussions. The greater Pittsburgh district, when taken together with Cleveland and Youngstown, constitutes more than 43 pct of total capacity in the steel industry. Most students of distribution are certain that this much capacity is far in excess of consumption in that area alone, under so-called normal conditions. If an f.o.b. mill system were installed, it is certain that the Pittsburgh-Youngstown-Cleveland area would be hardest hit.

THE fact that various interpretations of the Cement Case decision allow freight absorption is beside the point, according to many steel people. Only under the most troublesome circumstances would it be possible to absorb freight as the court ruling is interpreted. Furthermore, say steel officials, when normal times return, the strings around their ability to quickly meet competition by absorption would be Gordian knots.

Steel consumers are in an uproar over a possible change in steel selling methods. Most are studying what would happen to their market and their business if an f.o.b. mill were installed. In the early days of the discussion it was believed that all they had to do was move to a steel center. On sober reflection this was too easy a solution. Most steel users require many types and kinds of steel. There is no particular steel center except a few which could supply most of the needs of any steel consumer.

The steel user in a steel area might be able to get about half of his requirements. But for the other half he might find it necessary to go hundreds of miles—if, in fact, he could get the steel at all. The expense of getting that half might more than offset any advantage of being in a steel center.

More troublesome to the steel user than his steel supply, is his distance from his own consuming market. If he is too far from that area or density it may be to his disadvantage to be close to a steel mill area but far from his customers. This, say many steel people, is why the basing point system with its major basing point areas and its freight absorption works to the advantage of the consumer, as well as the producer.

It must be said for some FTC members and their chief legal counsel on steel that they have not been privately in favor of junking the entire basing point system.

SOME of these men feel that if the present methods of selling steel could be refined, revised and qualified, the result would be satisfactory to the FTC. All of the FTC members, however, do not think alike on this. But it makes little difference even if steel people would want to go along with FTC members on a cooperative exploration of the basing point system.

As long as the Supreme Court ruling on the basing point stands it is realistic to think that the system is out the window—even though a fight will be made. That is why many steel officials believe that "chaos" (as they see it) can only be prevented by legislation supporting the present method of selling steel.

As if the steel industry did not have enough to worry about, the General Motors wage settlement has isolated their attempt to stay or prevent the third round of wage increases. Because auto wages are important national factors it may be that U. S. Steel will have to look at their "price cutting-no wage increase" experiment sooner than they thought.

So far there has been no general reduction in prices (costs) to steel companies since steel quotations were cut. The steel price cut did not set so well with some steel firms but they went along on the basis that if it did not work it would be pulled out.

Now the GM wage settlement has reacted among steel labor officials just as it would be expected to do—anticipation of strong demands when contracts come up next year and an eagle eye on the thinking of U. S. Steel, which is on record that if the price cutting experiment did not work they would take another look at prices and wages. The next move is up to the steel firm. If it takes no action the steel union will take the initiative next February or March.

The steel ingot rate this week is estimated at 96.5 pct. This is up half a point from last week's revised rate of 96 pct. The only thing that can now prevent a long period of top level operations is a coal strike in July.

• **CLARIFICATION**—The Supreme Court is expected to tell the cement industry within the next 2 weeks what selling methods the court considers legal. The industry, as a result of the court's decision outlawing the basing point system, has asked for the additional ruling. Technically, the industry's move comes in the form of a request for rehearing. The court has stated that it will receive requests for rehearing up to June 1, after which it may clarify its opinion. The court then will transmit its opinion to the lower court with instructions to see that the decision is carried out. The lower court then will call in both parties to announce explicit details of the high court's decision. The Federal Trade Commission will keep close check on these legal steps and will require submission of reports of compliance 60 days after the lower court's action.

• **REORGANIZE**—Twenty-five former members and trustees of Steel Products Warehouse Assn. met in Cleveland recently as an organizing committee to re-establish the trade group on a permanent basis. Originally organized in 1942 during the war emergency, SPWA was voluntarily discontinued a year ago. The approximately 80 distributors and branch warehouse units included in the reorganization comprise a large segment tonnage-wise in the steel warehouse industry, specializing in the distribution of flat-rolled steel products. An immediate resumption of the association's earlier program to promote both public and private interests in steel warehouse services at national and local levels was determined at the Cleveland meting.

• **GAS LINES GOING UP**—Some 49 pct of the natural gas pipe lines installed in the years 1937 to 1941 were 12-in. diam and under, 19 pct were in the 14-in. to 18-in. group, and 30 pct in the 20-in. to 26-in. group. In 1946 the ratio changed to 17 pct 12-in., 26 pct in the middle sizes and 56 pct in the large diameter class. These figures were cited recently by G. Lawton Johnson, assistant general manager of sales, National Tube Co., to explain the difficulty pipe producers were having filling current orders. He estimated that this trend to large diameter pipe gives a projected picture for the next few years of only 3 pct of gas pipe line construction in the first group, 5 pct in the middle group and about 92 pct in the 20-in. to 30-in. diam sizes. For the 1947-1951 period 96 pct of the tonnage will be in the 20-in. to 30-in. diam sizes, he estimated.

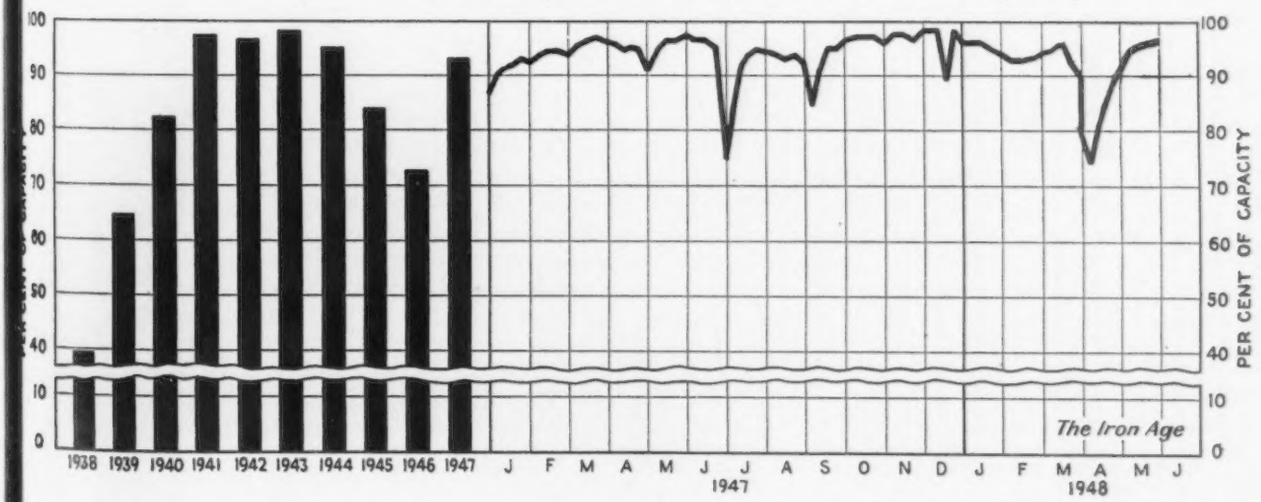
• **JUSTICE DENIES**—Justice Dept. attorneys told THE IRON AGE last week that published reports citing an alleged ruling which would prohibit trade association executives from serving on industry committees under the established Voluntary Allocations Law were "false." Justice feels that the membership of such committees is a matter for the individual departments to decide and emphasizes that it has issued no ruling on the subject. Another report that Justice had ruled that the Voluntary Allocations Law could not be used to meet defense and foreign aid requirements for steel and other scarce commodities was also denied by the Justice Dept. On May 28, no such ruling had been issued, although it appeared likely that one would be forthcoming soon. However, it was not indicated what direction such a ruling would take.

• **REFRACTORIES PRICES**—Producers of refractories, now operating under a cease and desist order, expect to publish new price schedules conforming with the order in about two weeks. The new development will require individual pricing at each company plant. Refractories producers may take advantage of this opportunity to revise their prices upward to take care of advancing costs, especially in view of the wage negotiations now under way in the industry.

• **ALCOA SUIT**—Whether or not the Federal Government's anti-trust suit against Alcoa can be reopened must be decided by the New York Circuit Court of Appeals, the Supreme Court has ruled. Alcoa is seeking to alter a previous ruling of the Circuit Court that the company is a monopoly. Changing conditions in the aluminum industry since the ruling was made have altered the company's position in the field, Alcoa tells the Supreme Court.

• **STRIKE COST**—The recent coal strike took 51¢ a week out of the average factory worker's pay check, according to preliminary April estimates by the Bureau of Labor Statistics. Average hourly earnings of production workers during the month remained stable at 1.29 but the average work week declined, chiefly as a result of the work stoppage in the mines which brought a lowered production in the iron and steel and automotive groups. Average weekly pay for durable goods workers is now $54.81 and the average for all industries is $51.56.

## *Steel Ingot Production by Districts and Per Cent of Capacity*




| Week of | Pittsburgh | Chicago | Youngstown | Philadelphia | Cleveland | Buffalo | Wheeling | South | Detroit | West | Ohio River | St. Louis | East | Aggregate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 98.5 | 95.5 | 93.0 | 90.0 | 95.0 | 93.0 | 104.0 | 102.0 | 102.0 | 94.0 | 99.0 | 84.0 | 98.0 | 96.0* |
| | 99.0 | 94.0 | 92.0 | 89.0 | 96.0 | 93.0 | 104.0 | 102.0 | 102.0 | 97.5 | 102.0 | 85.0 | 98.0 | 96.5** |

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# GM Wage Setup Isolates Steel's Move to Block Third Wage Round

*New York*

• • • **The General Motors wage** settlement has isolated the steel industry's attempt to block the third wage round. It may be a shot in the arm which could force a raise in steel wages next year or sooner. It can not be laughed off or explained away as being in a field different from steel and thus having no effect on steelworkers.

Just as steelworkers do not eat steel, auto workers do not eat automobiles—but the auto workers got a raise and the steelworkers did not. That is what is going through the minds of steelworkers this week. That is what will furnish the needle for the steel wage push slated for the next year's contract —or sooner.

The "no raise-price cut" move in steel was a bitter pill for the United Steelworkers of America. And it was no easy job for Phil Murray to tell delegates at the recent convention why he did not get workers more money. The real reason was simple—the union had tied itself up with a 2-year contract, a sterile reopening clause and a no-strike pledge if the wage grant was refused.

The GM settlement is more explosive to other industries like steel than it looks on the surface. That management has "thought of everything": (1) A raise that is permanent, (2) a promise that more of these will come each year, (3) a makeshift arrangement to raise pay as living costs go up or reduce them if they go down and (4) a point in the cost of living raise below which the company will not go in reducing its wages. That will be food for thought in other unions.

About 10 years ago U. S. Steel offered John L. Lewis (then CIO boss) a cost of living wage increase. It was to be tied to the same index as the auto rise—Bureau of Labor figures. Mr. Lewis sarcastically turned down such a raise at that time saying, it was "tying the steelworker to the wheels of chance."

General Motors has tried to sidestep the instability of a wage increase tied entirely to the cost of living index. The current pact in the auto firm may cause a lot of argument and trouble when the validity of the BLS figures are questioned. But it may be the step to a new kind of a contract. If that happens in Detroit it may and probably will happen elsewhere.

## Steel Wages Still Live Issue; Outcome This Year Depends On Price Cut Test

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By TOM CAMPBELL
*News-Markets Editor*

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The GM settlement will do nothing to patch up periodic strained relations between some steel leaders and Detroit auto officials—on the wage question. Last year U. S. Steel set the pattern. This year it hoped to set the pattern with its "stop inflation" plan. It could so hope because the contract said it could refuse to grant a wage increase and there would be no strike. GM had to do something because its contract ran out this year—and it did!

There is no hiding the fact that the GM raise has dampened the potential effects of the U. S. Steel "no wage increase-steel price cut pattern." Not only that but other steel companies which were dead set against a wage increase did not feel that steel prices should be lowered.

The next move on steel wages is up to the U. S. Corp—if a move is to be made this year. If not then the steel union will take the ball when the time comes for a new steel contract. The GM setlement will be salt in the wounds of the steelworkers this year. If coal miners get more and if the railroad controversy is settled in favor of the workers the steel wage negotiations early next year will be one of the scrappiest and toughest since 1946 when openhearths were cold for a month.

The steelworkers' union prides itself on being not only one of the biggest but one of the most conservative in the CIO group. But it is still made up of steelworkers. When they are aroused the coal miners don't have much on them. They were aroused at the recent steelworkers convention. It was only the prestige of Philip Murray with the delegates which prevented more fireworks on the wage increase turn down.

Now that there appears to be no united front on blocking a third wage round except in steel and electrical manufacturing industries (textile wages went up last fall and others have quietly advanced with no fireworks), managements of those industries will have to stand a lot of guff from the unions between now and next year. And it will be privately blamed on GM. For once U. S. Steel won't have to bear the brunt of criticism for stepping out with a wage increase when others thought none was warranted.

But there may be a catch somewhere. Benjamin Fairless' promise that if the price cut move did not work his company would have to take a look at prices—and wages —was no double-talk. He is on record with that statement. He has repeated since that time that he meant what he said. He told the union at their negotiations that he meant what he said. Sometime before the year is out he will have to make up his mind on the question—is it (the anti-inflation move) working or isn't it? If the answer is "no" he has no alternative except to reopen among his own management the price and wage question. The GM settlement has not helped him any.

If U. S. Steel does not do anything with prices or wages this year it knows full well what steel demands will be next year—if business is good—and it probably will be good. Granting a social security package which is in the mill now as a result of 1947 unfinished business (and not a new project as reported in some quarters) will not affect any wage ideas among USWA officials. And what happens to U. S. Steel happens to other steel firms as well.

The price cut is not setting too well with many steel firms. Costs are still going up and it is hard for

some steel officials to sit by and see the profits of other large industries far outdistance anything that steel firms can report. It has always been an ironic joke in private steel circles that the steel industry has been very generous pricewise to the auto industry. In some quarters stronger words have been used. This week there are steel officials and steel workers who think that the low steel prices and concessions to auto makers over the years have made it possible for such things as the current GM wage settlement. Whatever the outcome in the near future the wage question is still a live issue in steel, it is rattling in the cupboard and it may break down the door next year.

## Stainless Producers Bidding For Building Market With Display

*New York*

• • • **Stainless steel** producers began a drive for a larger share of the architectural market with the opening of a permanent exhibit of building applications of stainless steel, its fabricated products and examples of fabricating techniques at the Architects' Samples Building here. The exhibit was established through the cooperative effort of 13 producers and three suppliers of alloying agents, under the sponsorship of the American Iron and Steel Institute.

A breakdown of the industry's shipment figures shows that in 1947, the total tonnage of all forms of stainless steel that went into construction, contractors' products, domestic furniture and equipment, and appliances, utensils and cutlery was 45,900 tons. This was only 15 pct of total 1947 shipments of stainless steel, 295,546 tons.

The producers of stainless who cooperated in the exhibit were Allegheny Ludlum Steel Corp., Brackenridge, Pa.; Armco Steel Corp., Middletown, Ohio; Babcock & Wilcox Tube Co., Beaver Falls, Pa.; Carpenter Steel Co., Reading, Pa.; Copperweld Steel Co., Glassport, Pa.; Crucible Steel Co. of America, New York; Eastern Stainless Steel Corp., Baltimore; Joslyn Mfg. & Supply Co., Chicago; Republic Steel Corp., Cleveland; Sharon Steel Corp., Sharon, Pa.; Superior Steel Corp., Pittsburgh; United States Steel Corp., Pittsburgh; and Washington Steel Corp., Washington, Pa.

Alloy producers cooperating in the program include Electro Metallurgical Co., International Nickel Co., and Vanadium Corp. of America, all located in New York.

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***STLYISH STEEL:*** ***Graceful curves denote design of stainless steel staircase featured at permanent stainless steel industry exhibit now open to the public at 101 Park Ave., New York City. Other items featured on the exhibit range from barrels to surgical instruments.***

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## Shipment Of Iron, Steel For Exports Show Small Decrease

*Washington*

• • • **First quarter** export shipments of iron and steel amounted to 1,377,431 tons, according to Commerce Dept. figures. Included were 145,889 tons of welded and seamless pipe and 126,882 tons of black sheet.

Although this represents a small drop from the 1947 quarterly rate, it has been offset by a corresponding increase in the rate of exports of industrial and agricultural machinery and equipment.

For the same period, there has been a modest increase in the imports of copper, tin, nickel, ferroalloying and nonferrous ores and concentrates, Census figures show.

Exports of iron and steel during March rose by 15,000 tons after recording declines during January and February. Monthly figures are: January 500,767 tons; February 430,954 tons; and March 445,710 tons.

The second quarter quota of 845,150 virtually represents a doubling of first quarter shipments. First quarter exports of semi-finished and finished products (net tons) were:

Ingots, blooms, billets, slabs, sheet bars, 88,199; wire rods, 14,693; skelp, 17,019; iron bars, 1834; concrete reinforcement bars, 39,524; steel bars, cold-finished, 16,555; other steel bars (excludin alloy), 108,964; alloy steel bars, 23,769; welding rods, electric, 4238; boiler plate, 9213; other plates, not fab, 102,884; plates, fab, punched or shaped, 4953; iron sheets, black, 5343; steel sheets, black, 126,882; galvanized sheets, 12,722; strip steel, cold-rolled, 16,670; strip steel, hot-rolled, 22,274; tinplate and tagger's tin, 169,177; terne plate (incl. long ternes), 2363;

Structural shapes, plain, 89,731; structural shapes, fab, 45,846; frames and sashes, 826; sheet piling, 11,471; rails, 60 lb per yard and over, 108,159; rails, less than 60 lb per yard, 1588; rails, relaying, 7122; splice bars and tie plates, 25,590; frogs and switches, 2342; railroad spikes, 3219; railroad bolts, nuts, and washers, 2289; car wheels, tires and axles, 11,476;

Seamless black pipe, 5051; seamless casing and oil line pipe, 52,375; seamless boiler tubes, 10,861; welded black pipe, 17,978; welded galvanized pipe, 11,123; welded casting and oil line pipe, 59,362; welded boiler tubes, 459; other pipe and fittings, 19,861; plain wire, 20,527; galvanized wire, 15,341; barbed wire, 13,149; woven wire fencing, 3758; woven wire screen cloth, 1351; wire rope and strand, 3824; wire nails, 4837; other wire and manufactures, 12,858;

Horseshoe nails, 264; tacks, 1067; other nails, incl. staples, 2971; bolts, nuts, rivets and washers, except railroad, 15,501; forgings, 7853; horseshoes, 125.

# Exporters Praise Clarification of OIT's Licensing Procedure

*New York*

• • • **Present export** licensing regulations are confusing—even to exporters. But most foreign trade sources who have closely followed the various steps in the development of the Office of International Trade's current export licensing procedure agree that the smoke is beginning to clear a little.

This does not mean that exporters are in complete agreement with OIT's policy and method of licensing exports. Far from it—nearly every exported is in violent disagreement with current regulations, on one point or another. They will continue to oppose any and all regulations which they feel handicap their efforts to do business with their foreign clients.

Nevertheless, they feel that the new Current Export Bulletin 457, which clarifies CEB 431, is a step in the right direction—provided controls on exports are inevitable. The new export licensing procedure was worked out in consultation with the Industry Advisory Committee. It became effective June 1 and is applicable to all applications submitted for the third quarter, and later.

Of major interest to exporters of iron and steel products were two main points of departure from what was believed to be previous export policy of OIT.

(1) Hereafter, "license applications will be denied on the basis of price *only when the quoted prices are obviously excessive*." Previously, many exporters believed, OIT had granted export licenses on the basis of price, other things being equal. "Actually this was never true," one official pointed out. "One of the best services of this new bulletin is that it clears up the erroneous beliefs concerning the price criteria in export licensing."

(2) The "historical basis" will receive consideration in granting export licenses. Presumably, under this system, an exporter's previous shipment will be taken into consideration, but will not be the predominating factor.

As a matter of fact some trade sources point out that evidence of ability to actually ship the material, along with its end use, "appears to carry more weight in deciding who gets the license than the so-called historical basis."

## Only "Obviously Excessive" Prices to Form Basis For Rejections

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By BILL PACKARD
*Associate Editor*

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Although most exporters agree that the new bulletin has done much to clarify the position of OIT on export licensing procedure, they are probably more interested in the actual administration of the bulletin. They have no quarrel with the avowed policy aims of OIT—to protect the domestic economy (from the gray market) and to distribute products to deserving countries.

OIT's announcement of intent to confer with industry committees on problems arising from the administration of the rules in new bulletin is popular with export men. They feel that this is a big step toward making the regulations work with the least possible confusion, in addition to securing the cooperation of individuals who have in the past been more befuddled than opposed to the regulations.

The advice of commodity advisory committees drawn from the export trade will be sought in determining what constitutes "an obviously excessive price." Where normal trade practice makes it impractical to establish a firm contract price, the precise terms upon which the price is to be ascertained must be stated in the application. Such general statements as "market price at time of delivery or shipment" will not be acceptable.

With each license application must be submitted clear evidence of a two-way correspondence, resulting in an accepted order. However, the order may be conditional on arrangements for payment, or necessary government documents.

OIT says that it does not seek or undertake to give consideration to recommendations from foreign governments as to what U. S. exporters' licenses should be approved. Exports by U. S. Government will be permitted only when private trade channels are not available.

The oldest and loudest complaint exporters have leveled at the licensing procedure still holds. It is the time required to learn whether an application has been approved, rejected, or no action taken. Some exporters maintain that it is almost impossible to correlate mill quotas and export quotas. They blame the time-lag on applications.

In addition to the strain and delay involved in sweating out application approvals, they point out that, in some cases, their customer relations are suffering. After they have booked an order and are awaiting action on the application for export license, the customer is also waiting for his steel.

Although OIT has taken steps to hasten action on applications, some exporters are still unhappy on this score. They say it does no good to tell this to a customer who only wants to know if and when delivery can be made on the order he has placed.

But, despite their gripes, most exporters appear to be grateful for a better understanding of OIT procedure and policy, as well as the assurance that OIT will work closely with industry advisory committees. They still don't like it. But they think it is improving. "At least we understand it [now]," one sage pointed out.

## Residential Construction

*Washington*

• • • **Residential construction** activity rose 25 pct in the first four months of 1948 over the same period last year. Total home units started during the period totalled 257,000, of which about 90,000 were made in April for a new high.

# Industrial Briefs . . .

• CONSOLIDATION—Koppers Co., Inc., has announced new consolidated sales offices in New York at the Empire State Bldg., 350 Fifth Ave. and Chicago at the Peoples Gas Bldg., 122 S. Michigan Ave.

• ACQUISITION — The Diamond Machine Tool Co., Los Angeles, has purchased the complete line of Parker power shears and the revolutionary Multi-Max punch presses, previously manufactured by Parker Mfg. Co., Santa Monica, Calif.

• OXYGEN PLANT—A tonnage oxygen producing plant will be built and operated by the Linde Air Products Co. to supply oxygen to the Belle, W. Va., plant of E. I. du Pont de Nemours & Co. The output of the plant will be 360 tons a day of 95 pct pure oxygen and will be piped directly from Linde's plant to the du Pont plant.

• NEW SUBSIDIARY — To round out its line of woodworking machinery, Rockwell Mfg. Co., Pittsburgh, has purchased Star Products, Inc., Norwalk, Ohio. Star makes light, medium and heavy duty radial arm saws.

• ADDS WAREHOUSE—Levinson Steel Sales Co. has opened a new Pittsburgh district warehouse at Juniper and First Streets in Versailles, McKeesport. It will handle aluminum, copper, brass and steel products.

• CHANGES LOCATION—The Midwest Tool & Mfg. Co., producers of metal cutting tools and other products in Detroit, has moved its plant, manufacturing facilities and executive offices to Upper Sandusky, Ohio.

• AIRCRAFT CONTRACT — The Army Air Forces has awarded Texas Engineering & Mfg. Co. a $2,500,000 order for the complete overhaul of 45 Douglas C-54 transports extending into March of next year.

LEASES PLANT—The Fedders-Quigan Corp. has taken a long-term lease on the idle plant of the Buffalo Gasolene Motor Co. to expand its operations in Buffalo. New machinery will be installed for the manufacture of industrial heating and air-conditioning equipment, and a coin-operated vending machine with refrigeration which is now in development.

• ENGINEERING MEDAL — Ohio State University's Lamme Medal for meritorious achievement in engineering will be awarded this year to Earle C. Smith of Cleveland Heights, chief metallurgist of Republic Steel Corp.

• PURCHASE—The Greenfield Tap & Die Corp., Greenfield, Mass., has announced the purchase for cash of the Ampco Twist Drill Corp., Jackson, Mich., manufacturers of twist drills, reamers and end mills.

• FOR SALE—Arrangements for sale of the $5 million plant of the Symington-Gould Corp., Rochester, through the Asset Realization Co., Newark, N. J., have been completed. The plant includes more than 40 acres of land, improved with buildings having an aggregate of 475,000 sq ft, including the main structure of over 300,000 sq ft under one roof.

• HEADS GROUP—James B. Morrow, first vice-president of Pittsburgh Consolidation Coal Co., has been elected president of Bituminous Coal Research, Inc. He succeeds Howard N. Eavenson.

• NEW FIRM—Announcement was made recently of the organization of the American Steel Door Co. with plants at Detroit and Warren, Ohio. The organizing principals were William A. Ternes and Karl A. Dietrich. The chief products of the company are metal doors and frames for residential, commercial and public buildings.

## Ford Releases Advance Details on New Model

*Detroit*

• • • **With the formal** introduction of its new car scheduled for New York on June 11, Ford is gradually releasing additional details of the new model which is expected to carry the burden of Ford's bid for ultimate supremacy in the automobile market.

Advertisements appearing for the first time this week and announcements carried over the air indicated that the cars will be equipped with a brand new spring suspension system. As in the case of other postwar models the cars are much roomier and have appreciably wider front and rear seats.

The front spring suspension has been named "Hydra-coil" — coils springs combined with airdraft type shock absorbers. "Para-Flex" springs, parallel to the frame, will be used in the rear.

Overall height of the car has been reduced to 63 in. Ford engineers are claiming the new "Lifeguard" body of the postwar Ford will be 59 pct more rigid than the previous models. The rear window will be 88 pct larger than the previous Ford cars. Front seats will be 57 in. wide and rear seats 60 in. wide.

Ford advertising is emphasizing the "living room on wheels" theme in presenting its new models to the public.

## Reports 14 Pct Sales Increase For Quarter

*Toledo*

• • • **Royce G. Martin,** president of the Electric Auto-Lite Co., has reported consolidated net earnings of $2,708,998.60 equal to $1.81 per share for the 3 months ended Mar. 31, 1948 after providing for taxes and all necessary reserves. For the corresponding period of 1947, net earnings amounted to $2,095,381.72 or $1.40 per share.

Mr. Martin, in commenting on the operations, stated that sales for the current quarter amounted to $49,406,710.83 an increase of 14 pct over the same period a year ago.

Mr. Martin concluded by stating that negotiations toward the acquisition by the company of War Assets Corp. property at Lockland, Ohio, have been held in abeyance by government action pending determination of its status in the National Security program.

# Austin Answers Capacity Critics; Labels Demands "Fantastic"

*New York*

• • • **Steel men gathered** here last week for the American Iron & Steel Institute meeting were proud of their production record since the war ended. Facing what looks like another attack on the adequacy of present steel capacity they were vociferous in their statements that (1) present capacity is adequate (2) more capacity is to be installed (3) there is no need for strict government controls over steel distribution and (4) losses due to strikes in the past 3 years would be more than enough to have brought supply and demand into balance.

Keynoter for the industry viewpoint was David F. Austin, vice-president, sales, U. S. Steel Corp. of Delaware. He pleaded for a proper steel division in the voluntary allocation setup to take care of all steel programs.

There is no necessity for the enactment of legislation by Congress to return our economy to a controlled basis, since the voluntary method of allocating steel is essentially fair and practical and wholly adequate," said Mr. Austin.

"The steel industry has already recommended to Secretary of Commerce Sawyer, who is in charge of voluntary allocations, that the steel division be enlarged to a size adequate to take care of all programs, that it be staffed by experienced personnel, that necessary legal clearances be obtained, and that a screening committee be established to pass on the validity of the claims for special help.

"A multiplicity of departmental procedures and of steel allocating units within the government must be avoided if the steel needs of essential programs are to be met and other consumers served equitably."

"Another essential," he said, "is the establishment of a single, qualified group capable of studying, screening, authenticating and certifying the request of each claimant for steel, including the claims of governmental departments.

"The problem which the steel industry faces today is no longer confined to domestic and normal export requirements—it has become far more complicated. We have temporarily become the steel source for the whole peace-seeking world, just as during the war the United States became the arsenal of the Allies."

## Delaware Official Keynotes AISI Meet; Warns Of Danger in Costs

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Mr. Austin struck at "the fantastic increases in capacity" demanded by critics of the steel industry and pointed out that work stoppages and raw material shortages caused the loss of approximately 20 million tons of finished steel products in 1946 and 1947, which if added to actual production "might well have brought supply and demand into balance, if not in all products, certainly in many of them."

Mr. Austin warned that the construction of a greatly increased capacity at today's costs would create a price structure for steel products far beyond the average citizen's ability to pay, and might create vast unemployment and ultimate lowering of living standards.

"If devastated nations abroad are to be rebuilt to a sound economic basis, without continuing subsidy from this country's resources, then inevitably the steel industry must make a major contribution during each of the next several years. There is no option.

DAVID F. AUSTIN, vice-president, sales, U. S. Steel Corp. of Delaware

"A total forseeable dislocation of approximately 4 million tons of steel is indicated over the next 12 months by comparing the total amounts of steel required for essential steel consuming programs which already have appeared or are likely to make an early appearance with the tonnages currently flowing to the same end uses. The programs include the ERP export program, exports to countries other than those qualifying under the ERP, the needs of the Army, Navy and Maritime Commission, the freight car construction program, the oil and gas program, atomic energy projects and housing."

Attacking industry-wide bargaining at an industrial relations session of the AISI Senator Ball, R., Minn., claimed that as long as we have such bargaining we will have industry-wide strikes.

"In most labor disputes the public interest demands prohibition or restriction of industry-wide bargaining and that unions and employers shall bargain on a local or single employer basis," the Senator said.

"Both unions and management overwhelmingly oppose compulsory arbitration. They recognize that arbitration by law means nothing more or less than government price-fixing," said Senator Ball.

Senator Ball characterized the American economy as highly interdependent. He said that a long nation-wide shutdown of coal or steel production or of rail or water transportation, if continued long enough, could bring most production to a complete halt.

"In the public interest," he said, "no society can permit minority groups within it to destroy its essential fabric and hope to survive."

Wage increases have been a major factor in our present price spiral, Senator Ball declared. "Price increases have largely cancelled wage increases in recent years," he said. "Unfortunately the the price squeeze does not apply evenly. Strongly-organized workers may keep ahead of the gain while white collar employees and pensioners lag behind and are hit very hard. Those inequities would tend to iron out in a year or two once the spiral was stopped."

# Copper Market Seen Coming Into Balance Without Price Increase

*New York*

• • • **Some members** of the copper industry now believe that there is no longer any probability of a higher domestic copper price. This opinion is not shared universally by industry members, but those who are willing to talk about price developments of the future, sum up the probabilities along the following lines.

The current copper price has been adhered to since mid-1947 largely through the determination of the major domestic and South American producers to prevent their price from rising above the present market if at all possible. The principal threat to their success in holding the price stable despite many inflationary forces affecting the copper market has been the foreign buying market. In the last six months, foreign buying has become less important as a factor which could influence the domestic market due to the shortage of dollar funds abroad.

In recent weeks, however, before the allocation of funds for ECA buying of nonferrous metals, the pressure of foreign buyers for copper has grown stronger, in anticipation of the early availability of dollars. But large sellers of copper to the foreign market have continued to hold their price of 21.50¢ f.a.s. New York. Weighted average prices indicate that tonnages sold above this price are smaller. But foreign requirements under ECA, coupled with strategic stockpiling of copper which is now in effect with most producers committed for token contributions up to 10,000 tons over a six month period from one South American producer, are sure to exert an important inflationary effect.

## Dollar Shortage Decreasing Influence of Foreign Buying on Market

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BY JOHN ANTHONY
*Eastern Regional Editor*

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A new factor has recently entered the calculations of market analysts which is expected to offset such pressures. The currencies of Great Britain and many European nations have been stabilized at an artificially high level with respect to gold and the dollar. Although there have been many denials of foreign governments of any intention to devalue sterling and other currencies, some observers expect that they must soon revert to more reasonable levels. ECA administrator Hoffman has already stated that there would be some effort to encourage foreign currency devaluation so as to aid the purposes of the European Recovery Program. The International Monetary Fund has already announced its permission for devaluation of member government's currencies.

Past experience indicates that devaluation of sterling would lower the price of copper in terms of dollars. African copper, tied in to the sterling block, would be sure to rise somewhat in price sterling but observers are sure that in terms of dollars the world price of copper would be well below its present level.

Another deflationary factor affecting the domestic copper market has to do with the current spottiness of business in this country. So far, no copper producer has been able to take care of all the tonnage that has been asked for during any month since last summer. But there are growing indications that the copper market in this country is beginning to come into balance. Wire mill demand, which accounts for 60 pct of consumption in the country, is still active at a very high level and promises to continue so for many months because of the deferred buying by utilities during the war and the need for immediate expansion of power facilities.

Brass mill demand for copper has continued at a relatively high level, but order backlogs for brass mill products have dropped seriously. Unfilled orders of copper fabricators in terms of copper requirements dropped below 300,000 tons in March and April, as compared with nearly half a million tons during the first half of 1947, and well over that figure during the last half of 1946. Their inventories of refined copper are being maintained at a high level, 407,742 tons at the end of April, with 101,990 tons additional yet to come from producers. This represents 5 months

(CONTINUED ON PAGE 127)

## Coming Events

**June 6-9 American Gear Manufacturers Assn.**, annual meeting, Hot Springs, Va.

**June 6-11 Society of Automotive Engineers**, summer meeting, French Lick, Ind.

**June 7-9 American Coke and Coal Chemicals Institute**, annual meeting, White Sulphur Springs, W. Va.

**June 10-12 National Steam Specialty Club**, annual meeting, Hot Springs, Va.

**June 16-18 Electric Metal Makers Guild**, annual meeting, Bethlehem.

**June 21-25 American Society for Testing Materials**, annual meeting, Detroit.

**June 28-July 1 American Electroplaters' Society**, Convention and Industrial Finishing Exposition. Atlantic City.

**June 30-July 2 Machinery Dealers National Assn.**, convention, French Lick Springs, Ind.

**July 16-24 American Road Builders' Assn.**, convention and Road Show, Soldier Field, Chicago.

**Aug. 30-Sept. 3 American Chemical Society**, national meeting, Washington.

**Sept. 6-10 American Chemical Society**, national meeting, St. Louis.

**Sept.13-17 American Chemical Society**, national meeting, Portland, Ore.

# Weekly Gallup Polls . . .

## Favor Registration of Communist Party Members

*Princeton, N. J.*

• • • **The majority of** American voters think that most members of the American Communist Party are loyal to Russia, not to the United States, according to George Gallup, director, American Institute of Public Opinion.

Whether the public is right or wrong in its estimate, that is the fundamental attitude, which colors American thinking about such proposals as those embraced in the Mundt-Nixon bill. The prevalence of the attitude helps explain why Americans look upon the American Communist Party as something entirely different from various minor parties which in the past have espoused unpopular doctrines.

The general feeling of the voting population is that something ought to be done about the American Communist Party. The public is in a mood to accept almost any program which the experts think will work. For example:

One of the principal provisions of the Mundt-Nixon bill is that members of the Communist Party and officers of Communist Front organizations shall be required to file their names with the federal government.

The proposal is approved by an overwhelming majority of American voters, as follows:

**"Would you favor or oppose a law requiring all members of the Communist Party in this country to register (file their names) with the Justice Dept. in Washington?"**

| | Pct |
|---|---|
| Favor | 77 |
| Oppose | 12 |
| No opinion | 11 |

Harold E. Stassen in his campaigning for the Republican Presidential nomination has been advocating outlawing the American Communist Party. His rival, Gov. Thomas E. Dewey of New York, opposes this step on the grounds that the party if driven underground will spread its Idealogy and propaganda more effectively and that "you can't shoot an idea with a law."

Another provision of the Mundt-Nixon bill prohibits Communists from holding jobs in the federal government.

Sentiment in favor of that proposal was found overwhelming as far back as a year ago.

Until such a proposal does become law, however, the public is in favor of giving any government employee whose loyalty is questioned the right to a fair hearing on the charges.

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## U. S. Public Seen Willing To Approve Defense Alliance With 16 Western European Nations

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• • • **There is strong** evidence that the American people are prepared to give military backing to the new movement toward unity among Western European nations.

A coast-to-coast poll by the institute shows that more than six out of every ten American voters would approve a military alliance between their country and the 16 nations participating in the Marshall Plan.

This will come as important news to European statesmen who have lead the burgeoning movement for a union of Western European powers in the face of Russian threats. To date it has been an open question whether public opinion in this country would support a pledge of American military assistance in case one of the European nations were attacked.

Nationwide sentiment on this issue was tested in the following manner:

**"Do you think the United States and all the Western European countries participating in the Marshall Plan should join together in a permanent military alliance—that is, agree to come to each other's defense immediately if any one of them is attacked?"**

The answers:

| | Pct |
|---|---|
| Military alliance | 65 |
| No military alliance | 21 |
| No opinion | 14 |

The idea of a close political and economic union of the countries of Western Europe dates back many years, indeed many generations. In recent times Winston Churchill has often advocated a United States of Europe, a scheme which he reiterated at the Congress of Europe at the Hague.

Last year General de Gaulle of France proposed a military alliance among England, France and the United States, declaring that success of such a venture would depend on United States military support.

Several months later Ernest Bevin, British Foreign Minister, made his famous suggestion for a Western European Union, which bore fruit last March in the Brussels pact between England, and France and the so-called Benelux countries — Belgium, Netherlands and Luxembourg.

What today's survey of American sentiment indicates is that people here will support even greater strides toward European consolidation than the union already established. Voters are interested in building a bulwark against further Soviet aggression.

Apparently the stronger that bulwark is, the better Americans like it. Approval of an alliance with 16 European countries is more widespread than it is for the same kind of an alliance with just England and France.

# BLS Reports Increase In Labor Productivity From 1939 to 1945

## Man-Hour Per Unit of Labor Requirements Dropped 3 Pct In Period

By TOM LLOYD
*Machinery Editor*

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*New York*

• • • **In the manufacture** of 11 general types of industrial equipment, the average number of man-hours expended per unit of product was about 3 pct less in 1945 than in 1939, according to the Bureau of Labor Statistics. Betwen 1939 and 1942, the index of unit man-hour requirements declined steadily to a point 5 pct below that of 1939 as important gains in manufacturing efficiency were made.

This was a period of rapidly expanding output and widescale improvement in production machinery and methods, as well as a period of extensive reductions in the number and variety of models produced. Between 1939 and 1942, however, the trend was toward lower productivity because of manpower shortages, material shortages, inexperienced labor, and increases in many overhead labor categories such as maintenance, supervision, inspection and materials handling. The indexes developed by the Bureau are based on reports submitted by 83 companies which produced about 25 pct of all general industrial equipment.

Table I shows indexes of total factory man-hours expended per unit for the manufacture of 16 classified items. Total factory man-hours include, as well as the direct labor categories of machining, metalworking, fabrication and assembly operations, that labor assigned by factory accountants to specific products, including generally such operations as maintenance, shipping, warehousing, materials handling, factory supervision, timekeeping, inspection, machine setup, production engineering and materials control.

Table II shows indexes of only the direct labor man-hours expended per unit for the manufacture of the same equipment. Proportionately, gains made in productivity per man-hour of direct labor were far greater than those made in total factory labor.

Factors that tended to improve efficiency, especially of direct labor, were: (1) The rapid increase in the volume of output of most types of industrial equipment; (2) the trend toward standardization and simplification of such equipment; (3) the procurement of new machinery and equipment designed for more efficient and larger scale manufacturing operations; (4) the trend toward semi-line or line-type production; (5) the development of equipment, particularly machine tools and presses, that permitted higher speed operation and consequent higher production; and (6) the greater willingness of industrial plants to better coordinate and consolidate manufacturing operations to meet war demands.

Plants reporting significant changes in machinery, equipment, work methods, plant layout, etc., showed a composite trend in man-hours expended per unit that was consistently downward throughout the period, with only a slight rise in the years 1942 and 1943. By 1945, the level of man-hour requirements in these plants was only 88 pct of the 1939 base.

In contrast, the number of man-hours expended per unit in plants which reported no significant technological changes rose steadily from 1940 after an insignificant decrease from 1939 to 1940. The sharpest rise came between 1942 and 1943 when industry was encountering severe problems which tended to limit productivity. By 1944, the index for these plants was 20 pct higher than the 1939 base. A slight reduction from 1944 to 1945 brought the index for 1945 to 118 pct of 1939.

Trends in man-hours required for reporting plants, classified according to size of plant, are shown in table III. All size groups shown are based on reports that were representative of the variety of products included in the industry coverage with the exception of the largest plant classification. In this case, the product reports were overweighted by plants manufacturing bearings and gasoline engines, both of which showed relatively favorable unit man-hour requirement experience during the period.

Table III indicates that establishments in the largest and in the three smallest size categories reported trends in total factory labor man-hours which were more favorable than those reported for the two intervening classifications.

The data, when classified according to areas, show trends in unit man-hour requirements for different areas in which reporting companies were located. The plants in the New England area had the best experience in maintaining a favorable trend of man-hour requirements.

It is significant, however, that the product reports upon which the

TABLE I

Indexes of Total Factory Man-Hours Expended per Unit for the Manufacture of Selected Types of Industrial Equipment
(1939 = 100)

| Products | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 |
|---|---|---|---|---|---|---|
| Ball Bearings | 102.4 | 99.3 | 89.7 | 87.6 | 83.4 | 86.9 |
| Roller bearings | 95.4 | 86.5 | 88.3 | 102.0 | 105.8 | 101.1 |
| Gear speed reducers, variable speed transmissions | 75.4 | 70.1 | 66.2 | 67.3 | 70.2 | 68.0 |
| Gasoline and diesel engines | 97.8 | 93.9 | 94.6 | 99.4 | 102.8 | 100.0 |
| Centrifugal pumps | 96.4 | 97.8 | 97.6 | 102.3 | 101.8 | 104.0 |
| Portable and stationary air compressors | 100.0 | 96.8 | 98.5 | 92.8 | 85.3 | 71.6 |
| Belt conveyor components | 94.3 | 94.9 | 99.8 | 117.5 | 118.1 | 121.8 |
| Portable elevators and bucket loaders | 93.7 | 95.6 | 111.1 | 106.3 | 110.0 | 105.3 |
| Locomotive cranes | 105.0 | 93.0 | 102.5 | 93.2 | 88.7 | 80.4 |
| Industrial fork trucks and hand lift trucks | 100.0 | 89.8 | 79.7 | 91.5 | 84.8 | 87.5 |
| Industrial oil burners and mechanical stokers | 100.2 | 100.9 | 104.5 | 97.5 | 99.3 | 96.3 |
| Centrifugal blowers and propeller fans | 103.6 | 108.0 | 116.5 | 136.4 | 143.5 | 131.0 |
| Electric hardening furnaces | 91.2 | 97.5 | 106.1 | 108.5 | 96.6 | 98.0 |
| Welding torches | 108.6 | 110.3 | 103.7 | 111.4 | 119.9 | 103.4 |
| Floor scales | 97.2 | 96.5 | 96.6 | 97.7 | 95.7 | 95.7 |
| Recording thermometers and indicating pyrometers | 104.0 | 108.3 | 105.7 | 98.5 | 103.0 | 109.7 |
| All products combined | 97.8 | 95.3 | 95.0 | 99.0 | 99.6 | 96.7 |

TABLE II

Indexes of Direct Labor Man-Hours Expended per Unit for the Manufacture of Selected Types of Industrial Equipment
(1939 = 100)

| Products | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 |
|---|---|---|---|---|---|---|
| Ball bearings | 101.0 | 98.4 | 89.1 | 77.6 | 63.2 | 63.0 |
| Roller bearings | 91.1 | 82.2 | 89.4 | 107.9 | 111.8 | 98.2 |
| Gear speed reducers, variable speed transmissions | 72.3 | 67.3 | 62.2 | 64.3 | 66.6 | 62.6 |
| Gasoline and diesel engines | 99.7 | 95.1 | 91.2 | 92.0 | 90.7 | 80.0 |
| Centrifugal pumps | 100.1 | 99.9 | 100.9 | 105.1 | 104.9 | 106.6 |
| Portable and stationary air compressors | 100.0 | 95.3 | 98.4 | 95.6 | 89.3 | 83.9 |
| Belt conveyor components | 98.4 | 99.6 | 97.4 | 101.4 | 101.4 | 99.9 |
| Portable elevators and bucket loaders | * | * | * | * | * | * |
| Locomotive cranes | 107.0 | 94.7 | 104.3 | 95.0 | 89.1 | 81.8 |
| Industrial fork trucks and hand lift trucks | * | * | * | * | * | * |
| Industrial oil burners and mechanical stokers | 99.8 | 100.2 | 104.6 | 98.4 | 98.2 | 92.8 |
| Centrifugal blowers and propeller fans | 103.2 | 106.2 | 113.4 | 127.2 | 129.0 | 115.5 |
| Electric hardening furnaces | 91.6 | 97.8 | 104.4 | 106.4 | 95.5 | 94.2 |
| Welding torches | 112.9 | 112.9 | 107.4 | 111.8 | 117.1 | 97.9 |
| Floor scales | 95.3 | 95.9 | 97.4 | 95.0 | 95.8 | 95.8 |
| Recording thermometers and indicating pyrometers | 104.4 | 108.6 | 105.8 | 98.6 | 103.2 | 106.2 |
| All products combined | 96.8 | 94.3 | 93.7 | 95.7 | 93.5 | 86.9 |

*—Data on direct labor not available. Information included in Table I on Total Factory Labor.

geographical trends for the New England states were based, consisted preponderantly of items which had composite product index trends that remained level or declined during this period. The same bias, in terms of a representation of items, with very similar trends, was found in product reports for the New York, New Jersey and Pennsylvania area index. The product reports of the other two areas consisted of a distribution of items for which trends moved both up and down.

It appears, therefore, that there is lack of evidence to substantiate any direct relationship between geographical location and trends in unit man-hour requirements.

The Bureau itemized several factors that tend to lower efficiency throughout most of the period covered, which may or may not continue to affect productivity.

One of the more important influences adversely affecting productivity was the extensive dilution of both supervisory and direct labor forces. This condition resulted mainly from the war demands for manpower. Plant adjustments necessary to permit rapid expansions in volume of production generally led to sharp increases in both the absolute level and in the proportion of indirect or overhead labor.

Substantial increases during the 1939-1945 period had to be made in the amount of maintenance required to keep production equipment in working order. Extra shifts, longer hours, and inexperienced operators contributed to this condition.

Simplification and specialization of job functions necessitated the expansion of both direct and indirect labor forces, and at the same time increased the amount of supervision required. Increases in the amount of inspection likewise tended to lower unit man-hour production.

Spasmodic and irregular receipt of parts, components, materials, and supplies, which complicated materials movement and storage problems, necessitated extra handling labor. Turnover and absenteeism had a serious influence on productivity, and longer work weeks served to lower the average output per man-hour.

TABLE III

Indexes of Total Factory Man-Hours Expended per Unit for the Manufacture of General Industrial Equipment
(By Size of Plant)
(1939 = 100)

| Number of Employees* | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 |
|---|---|---|---|---|---|---|
| Less than 100 | 91.0 | 98.0 | 112.6 | 111.6 | 101.2 | 94.4 |
| 101 to 250 | 97.3 | 96.8 | 95.1 | 99.4 | 103.4 | 96.8 |
| 251 to 500 | 97.9 | 98.0 | 99.7 | 100.9 | 102.7 | 99.0 |
| 501 to 1000 | 92.6 | 94.8 | 105.3 | 115.3 | 116.7 | 112.2 |
| 1001 to 2500 | 99.6 | 98.1 | 100.2 | 104.5 | 104.6 | 103.7 |
| 2500 and over | 101.2 | 97.6 | 93.7 | 97.3 | 97.7 | 95.5 |

*—Average number of employees, first six months of 1945.

# Construction Steel . .

• • • **Fabricated steel awards** this week included the following:

**1600 Tons,** Childersburg, Ala., rayon yarn plant for Beaunit Mills, Inc., to Bethlehem Steel Co., Bethlehem.

**400 Tons,** Texas, off shore wells in the Gulf of Mexico, for Pure Oil Co. to Bethlehem Steel Co., Bethlehem.

• • • **Fabricated steel inquiries** this week included the following:

**6350 Tons,** States of Virginia and Indiana, Transmission towers for the American Gas & Electric Co.

**2000 Tons,** Hamden, S. C., fiber plant for E. I. duPont de Nemours Co.

• • • **Reinforcing bar awards** this week included the following:

**250 Tons,** Mendota, Ill., building for the Illinois Farm Supply Co. through James Stewart Co. to Bethlehem Steel Co., Bethlehem.

• • • **Reinforcing bar inquiries** this week included the following:

**1000 Tons, Des** Moines, office building for State of Iowa, Johnson, Drake & Piper, of Minneapolis, low bidder.

• • • **Plate inquiries** this week included the following:

**2400 Tons,** Chicago, oil barge building program for Carbide & Carbon Chemical Co.

• • • **Railroad car awards** this week included the following:

The Chicago & Northwestern R.R. has ordered 50 70-ton drop end gondolas from the Pressed Steel Car Co., McKeesrock, Pa. The Western & Maryland R.R. has ordered 1000 hopper cars 65-ton capacity from the Pressed Steel Car Co. The Pressed Steel Car Co. was awarded 50 mill-type 70-ton cars by the Frisco Lines. The Nashville, Chattanooga and St. Louis R.R. has ordered 50 70-ton gondolas from Pressed Steel Car Co. The Seaboard Airlines has ordered 100 50-ton low side gondolas from American Car & Foundry.

• • • **Railroad car inquiries** this week included the following:

The Western & Maryland R.R. is inquiring for 2000 50-ton 40 ft 6 in. box cars, 50 50-ton 50 ft 6 in. box cars, 200 50-ton gondolas and 50 70-ton gondolas.

## No Copper Rise Seen

(CONTINUED ON PAGE 124)

consumption of copper, which dropped to 117,331 tons in April.

ERP and the rearmament program, here and abroad, constitute strengthening factors on the metal markets. But some members of the copper market view the Russian peace offensive and the coming elections as possible turning points in the demand for metals growing out of these programs. In the meantime, soft spots have appeared in the economy at many points even in heavy industry.

# Contracts For 70-Group Air Force Expected Within 60-90 Days

*Washington*

• • •**The Air Force Dept.**, proceeding on the theory that the new 70-group procurement program will have far less effect on the nation's economy than originally predicted, expects to let a major portion of the contracts necessary to the 5-year program within the next 60 to 90 days.

Earlier estimates of the effects of the $3,198,000,000 defense measure on the national economy have now been set aside, the planners in the Air Force Dept. and in the aircraft industry are in virtual agreement that the aircraft construction program probably will require no more than 8000 tons of high alloy steel annually and no more than 20 million lb of aluminum in any one year.

"The only real shortage we expect to encounter during the first year is one of electric power, particularly on the West Coast," one AF procurement official states. Aluminum and steel requirements will "require some careful planning," but are not expected to result in any serious dislocations in other branches of industry.

A production bottleneck of a nonmaterial nature that is expected to arise is that supplied by the renegotiation provisions of the law providing for aircraft procurement. Under the new program, all prime or subcontracts in excess of $1000 are subject to renegotiation if the total orders held by a manufacturer in one year exceed $100,000 and the Secretary of Defense believes excessive profits have been made.

## Tonnage Estimates Revised; Aim Plans At Avoiding Of Dislocations

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By GENE HARDY
*Washington Editor*

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Some procurement officials are fearful that this provision will make some contractors and subcontractors leery of entering into contracts under the new law. Small manufacturers in the automotive industries, for example, are already enjoying good business without taking on the hazards of renegotiation.

The Air Force Dept. says it is shooting for a total of 2,727 aircraft between now and July 1950. The first of these—mostly repeat orders for existing types—are scheduled for delivery by January 1949 and 2100 by July 1950. The program calls for production of such types as the Boeing B-50, Republic P-84 Thunderjet, North American B-54 four-jet bomber, Curtiss-Wright P-87 four-jet all-weather fighter, North American P-86 jet fighter, and the improved Lockheed P-80.

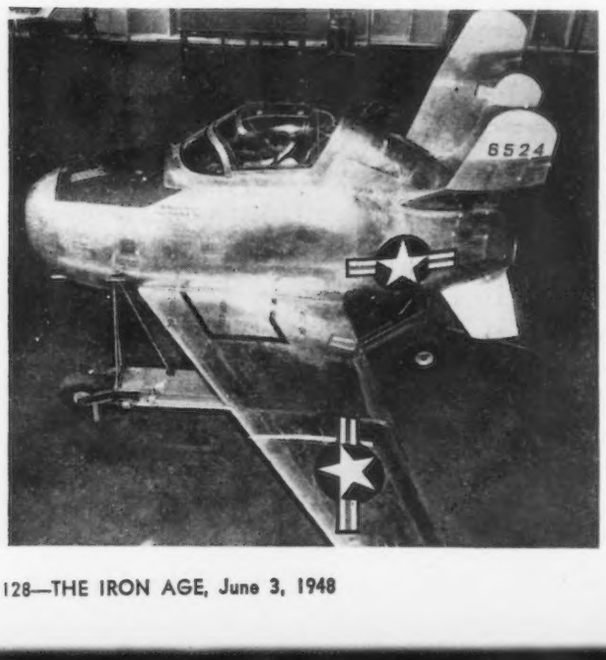
In addition to new tooling to meet the stepped-up production goals, Air Force planners also are providing for a production and industrial base from which the aircraft industry could expand rapidly in time of emergency. To meet this end, the Federal Government is retaining title to all plant investment, plant changes, production tools, and equipment purchased. Subcontracting will be employed in order to avoid the expense of new plants.

"We have taken back some War Assets Administration plants for which in the past other moneys were made available for maintenance and rehabilitation," according to one planning officer. "There would be no brick and mortar for private industry and no new construction in this program," he added. Tools will remain government property.

President Truman, who originally asked Congress to appropriate only enough supplemental funds to set up a 55-group air force, said in signing the bill that he would review the entire military program in September and again in December with a view toward possible reduction of expenditures.

"The Congress has seen fit to provide $822,000,000 beyond the amount which I considered necessary in submitting my request for the acceleration of the program," Mr. Truman said. "Provision has been made, however, that the funds shall not be spent without a finding by the President that the 'contracts let are necessary in the national defense,' and that the procurement results in the 'maximum utilization of improvements in aircraft and equipment consistent with the defense needs of the U. S.' To assist me in discharging this responsibility, I have asked the Secretary of Defense and the Director of the Budget to formulate and recommend appropriate procedures."

"I informed the Congress on May 13 that I intend to review the entire military program in September and again in December. Our national security requires that the total national defense program be based on a strong economic system and depend on a level of expenditures which can be supported in subsequent years."

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***PARASITE FIGHTER:** The McDonnell XF-85, parasite fighter plane, has been rolled out for ground and wind tunnel tests. The fighter, designed to fit in the bomb bay of a Consolidated Vultee B-36, will be flight tested in a modified Boeing B-29 during the Summer.*

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## Metal Exposition To Be Held Oct. 25 To 30 In Philadelphia

*Cleveland*

• • • **The 30th Annual** National Metal Congress and Exposition will be held in Philadelphia's Commercial Museum and Convention Halls for 5 days beginning Monday, Oct. 25, 1948.

W. H. Eisenman, national secretary, American Society for Metals, and managing director of the Exposition, announced locale and dates and stated that the Exposition will again be sponsored by the A.S.M.

Floor plans for the 1948 exposition were mailed last week to former exhibitors, while mailings to others will be made later.

Meeting simultaneously with the A.S.M. will be the American Welding Society, the Institute of Metals Div., American Institute of Mining & Metallurgical Engineers, and the Society for Non-Destructive Testing (formerly American Industrial Radium and X-Ray Society). These societies will conduct technical programs relating to the science of metals during the week of Oct. 25.

The 1948 Metal Congress and Exposition marks the fourth time that the event has been held in Philadelphia—previous dates being 1920, 1928 and 1941.

Anticipated attendance is estimated at approximately 30,000 persons from industrial classifications.

Technical programs of the four technical societies will be announced at a later date.

## Western Railroads Ask Lower Pig Iron Rates

*Washington*

• • • **Western railroads,** through their tariff publishing agent, have petitioned the Interstate Commerce Commission for special permission to put into effect on one day's notice a reduced rate on pig iron shipment from Geneva and Ironton, Utah to Chicago and Morton Grove, Ill., or Slinger, Wis.

The reduced rate would be $10.63 per gross ton as compared with the existing rate of $13.70 per gross ton, the same rate applying to Flint, Pontiac and Saginaw, Mich.

The tariff agent in his application pointed out that the furnace at Ironton, Utah, recently purchased by Kaiser, Inc., was ready to ship and that 80 pct of its output will be destined for eastern mills. He added that the $13.70 rate is too high and the reduction is urgently needed in order to get the pig iron moving.

## Effects of Cement Case Decision To Be Studied

*Washington*

• • • **A Senate Commerce** Subcommittee this week heard testimony on a proposal to study the effects of the supreme court's decisions in the Cement Institute and Morton Salt cases.

Senator Capehart, R., Ind., chairman of the subcommittee, is also sponsor of the senate resolution (S Res 241) appropriating $15,000 for a formal investigation of the effects on industry of the court decisions.

Other members of the Capehart subcommittee are Senators Hawkes, R., N. J., Brewster, R., Maine, Johnson, D., Col., and McMahon, D., Conn.

"Introduction of the resolution was prompted by the indication that drastic changes might result from the decision in the nation's economy and the distribution of commodities through the effect of the decisions on the basing point system of delivered prices by individual companies," Senator Capehart stated.

Among the witnesses scheduled to testify at the initial hearing this week were the five members of the Federal Trade Commission. The commission currently consists of two Republicans—Robert E. Freer and Lowell B. Mason—and three Democrats—Garland S. Ferguson, Erwin L. Davis, and William A. Ayres.

# 50 YEARS AGO

THE IRON AGE, *June 2, 1898*

• "We do not believe that the majority of the people of the United States desire now or later to abandon the policy pursued for a century of keeping clear of European quarrels. Nor do we believe that the majority desire to embark on a course of territorial aggrandizement. But we must recognize that the days of our isolation are over. We are expanding our trade relations all over the world and there are great nations who do not hesitate to override competition by military force."

• **"Announcement is made that the much talked of project of building a large steel plant at Birmingham is rapidly approaching a favorable settlement. It is stated the Tennessee Coal, Iron & Railroad Co. has financed the undertaking."**

• "Some weeks ago we began the publication of a weekly report of the machinery market. In the early days of trade journalism, in all staple lines, the publication of market information was considered almost a crime. Fortunately, those days have long since passed."

• **"The Carborundum Co. of Niagara Falls is about to enlarge their plant to manufacture articles which will be a distinct departure from their present line and which, it is expected, will add largely to the consumption of carborundum. It is their intention to spread carborundum on cloth, paper and possibly leather to place this new abrasive in direct competition with emery, flint and garnet cloth and paper manufacturers."**

• "Of the extension of technical education, Germany has always been the most prominent exponent. The whole German people are being educated scientifically in the arts of industrial production. Nowhere in the world does manufacturing become so nearly a profession as in Saxony where there are no less than 111 technical institutions."

# MACHINE TOOLS

*. . . News and Market Activities*

## Builders Discuss Industrial Program With Materiel Command

• • • **Representatives** of the machine tool industry met recently with officers and civilian personnel representing the air materiel command to discuss the Air Force Industrial machine tool program, a trial and error test which, according to reports percolating through the trade, left something to be desired in the way of efficiency.

Specifically, the meeting, which took place in the office of the deputy chief of the industrial mobilization program, was for the purpose of receiving recommendations based on observations made by industry representatives during a 3-day trip to the two storage sites, at Marietta, Ga., and Omaha, Neb., and to Boeing Airplane Co., Wichita Div., where tools from storage sites are now being installed for production operation.

This meeting, it is understood, brought into sharp focus certain shortcomings in the handling of JANMAT tools and as a result of recommendations of the industry representatives, it is likely that the AAF will, in the future, get its inventory position straightened out, get the tools segregated and stored with attached parts, cease disassembling tools, find out the recommended list of spare parts to be used in the event of an emergency, and maintain a spare parts pool.

Industry representatives, it is understood, were of the opinion that a lot of extra work was being done for which the Air Forces were not going to receive the results which they anticipated. In addition, a lot of the equipment is being worked on that should not be worked on. Representatives were also of the opinion that a lot of the machines will not be really fit to go into production without a lot of additional work duplicating work already done.

Indications are that this meeting will bring about closer cooperation between the machine tool industry and the air materiel command, which is in great need of experienced machine tool personnel for screening, inspection, processing and repair at the storage sites.

### Industry's Representatives Give Recommendations For Mobilization

o o o

In Chicago the survey made to determine the number of machine tools needed for the revitalized aircraft program has caused plenty of confusion. The survey included projected needs to and including 1952, and the first estimated requirement of 52,000 tools was found to be in error. Officials met May 26 at Wright Field in an attempt to clarify matters. Some observers report the survey, when studied closely, indicated the number of tools needed closer to 4000.

Machine tool makers in Chicago are awaiting the aircraft tooling program. They are uncertain how much of the requirements will be filled out of the tools already stored under the JANMAT program.

The largest single packer of such tools told THE IRON AGE that so far they have processed and inventoried about 10,000 tools and have 30,000 left. Their force has been cut back but they still have a contract and their operations in the future depend entirely on the Air Corps final decision on the tooling program. The only tool order of any size which has been filled from JANMAT's stockpile is the quantity of tools shipped to Boeing Aircraft Co., at Wichita, Kan., for the remodeling program now in operation on 1000 B29's.

In the midwest all toolmakers are looking for business. May order volume was equal to April but neither month was as good as March. Prices are firm, only four makers out of 27 still carry escalator clauses. The Tucker Corp. has a considerable number of inquiries out for large press equipment. It is now apparent that Tucker plans to build bodies here instead of at Detroit as was the original plan.

Elsewhere indications are that those segments of the industry which have not completed wage settlements will find the waters muddied by the General Motors agreement. Many machine tool builders are committed on long term deliveries, and wage increases at this time will certainly upset the cost structure. If the GM settlement marks the start of another round of wage increases and price increases, many segments of the machine tool industry are likely to go back to escalator clauses in their sales contracts.

Rumor has it that the bulk of the machine tool requirements of one branch of the Armed Forces is already prepared on contracts in telegraphic form, ready to go on short notice. Even if this nation is not at war, these orders are mandatory, it is understood, and machine tool builders would be required to accept them, and perhaps be forced in order to make delivery to drop contract work as well as new products which have been taken on for postwar stability.

Material ordered under the supplementary appropriation for the AAF will carry renegotiation clauses in the contracts, which in turn will probably set the pattern for the rest of the ordering by all branches of the Armed Forces.

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## Eaton To Manufacture Canadian Truck Axles

*St. Catharines, Ont.*

• • • **Eaton Mfg. Co.** has completed arrangements with McKinnon Industries, Ltd., a subsidiary of General Motors Corp., to manufacture the Eaton two-speed truck axle in St. Catharines, Ont.

The experience and engineering knowledge of Eaton engineers will be placed at the disposal of the Canadian manufacturer. At present, Canadian production will be confined to axles for trucks of 1½ to 3-ton capacity available to all Canadian truck manufacturers.

# SCRAP

. . . News and Market Activities

## Prices and Movements Remain Steady

*New York*

• • • **Market activity and prices** are holding the steadiness of recent months with no overall trends or price changes evidenced.

Grading and preparation practices continue to make news. In Cleveland a major consumer is accepting a limited tonnage of No. 2 bundles containing up to 50 pct tin cans. A stipulation on this is that the bundles must be so designated. In the same market, dealers are preparing No. 2 heavy melting in less than 3 ft lengths to accommodate the mills.

In Philadelphia and New York it had gradually become standard practice to pass a mixture of Nos. 1 and 2 heavy melting material as No. 1 scrap. This has resulted in a very messy situation in those markets — particularly from the dealers' standpoint—as one consumer who required top quality material for some high grade plates was forced to and was willing to pay a premium to get the scrap sorted and genuine No. 1 sent his way. Now, contracts on No. 1 material are haywire and the situation will be confused until more precise grading and preparing practices are reestablished.

The problem of who is to absorb the freight increase is still being kicked around in most of the markets and there does not seem to be a general overall practice being developed.

The Senate Finance Committee has approved the bill to continue present duty-free importation of scrap through June 30, 1949. The measure has already passed the House and is expected to meet little resistance on the Senate floor.

•

PITTSBURGH—The market was listless during the past week with some consumers reporting a slight increase in shipments, some a small drop. A slight dip in number of cars rejected is also reported. Some of the scrap that had been coming into this district from New York State and the East was said to have been diverted to the Valley during the past week though one of the large buyers here indicated the diversion had no effect at all on receipts, which had actually improved. The cast market remained tight. No price changes were reported either in steel or iron scrap. In fact, new business was reportedly too small to produce any price activity.

•

CHICAGO—Mills report good inventories, heavy shipments and little change of securing scrap at prices lower than formula. Brokers say they are still paying 50¢ over in some cases to fill old orders although buying has become somewhat easier in the past week. The scramble for cast iron borings has relaxed a little with prices now somewhat lower. Railroad lists closed with very few changes over previous prices. Brokers and dealers are busy calculating the new freight rates as the mills so far will not absorb the recent increase. Buyers of remote scrap are particularly interested in the application of new rates which cannot exceed $4.00 a ton on scrap.

•

PHILADELPHIA—Scrap prices were unchanged last week. Although scrap is moving freely, the volume coming into yards has dropped appreciably and dealers are paying higher prices for unprepared. A price of $33.00 for unprepared at Norfolk has been reported. Brokers are paying dealers $38.50 and $39.00 for No. 2. One mill has discontinued paying the freight rate increase on new business which comes to 40¢ to 50¢ a ton out of eastern markets.

•

CLEVELAND—Preparation is in the spotlight this week as one major consumer has agreed to a limited tonnage of No. 2 bundles containing up to 50 pct tin cans, as long as they are designated as such. On the other hand, dealers have agreed to prepare No. 2 steel under 3 ft to help consumers cut down charging time. Mills are in a fairly comfortable inventory position, although shipments have fallen off the past week. Foundry grades are a little softer, otherwise there has been no substantial change in the market.

•

DETROIT—The market continues unchanged and dulled somewhat by the strike and general labor uncertainty. Foundry material in particular is soft although the situation has not yet affected prices. Shipments are down, but dealers are not yet willing to sacrifice material.

•

BUFFALO—Cast scrap prices were on the easy side last week. No. 1 cupola sold at $65 compared with a recent top of $68 and mixed cast was down $1 at $62 to $63. The softness appeared to affect most foundry specialties except malleable. Low phos plate was reported selling mostly at the $44.75 ceiling with only occasional sales at the outside prices. Steel mill scrap was steady, but shipments tapered off after a spurt. Refusal of leading consumers to bear the increased freight charges was still a point of contention and a number of dealers remained on the side lines. One of the latter estimated the average local switching charge was upped about $1.50 per car. The Pittsburgh district consumer who has been an active over-formula buyer downstate was reported to have cut his "springboard" from $2.50 to $1 a ton.

•

BIRMINGHAM—With consumers having considerable inventories as a result of the coal strike, foundry grades are moving very slowly here. On the other hand, openhearth grades are moving briskly and cast grades remain in heavy demand. Prices are unchanged.

•

NEW YORK — Movements continued about the same. Pricewise cost was a little stronger, moving up $1 on all items. Movements of genuine No. 1 to eastern Pennsylvania continued and the premium price for the top grade steelmaking scrap held at $36.50 to $37.50.

•

CINCINNATI—There has been no material change in the market here. Openhearth grades are moving at formula despite resistance on the part of some dealers who are inclined to hold out for higher priced orders. Cast has slowed in certain spots and consumers are tightening up on the grading accordingly. Most mills are fairly comfortable with inventories from three to five weeks. Rails are holding up, despite predictions to the contrary, and electric furnace grades are stronger.

•

BOSTON—Prices are holding firm in a fairly active market after the first break in cast in many weeks. The scrap demand is good and brokers are buying on the basis of fromula prices.

•

ST. LOUIS—Because of a strong demand from outside markets for use in rerolling steel car axles advanced again this week. Cast iron grades are weak as foundries have satisfied their requirements. Receipts were little changed over last week.

•

TORONTO—Scrap iron and steel receipts are running to slightly better volume with deliveries now coming east from Western Canada. However, the supply situation remains tight with not enough reaching the markets to meet current consumption requirements. Steel mills are drawing on reserve stocks which were accumulated by importation last year and these supplies are rapidly being depleted. It is learned from reliable sources that contracts have been entered into whereby large tonnages will be brought into Canada before the close of navigation this year.

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

## PITTSBURGH

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $40.00 to $40.50 |
| RR. hvy. melting | 41.00 to 41.50 |
| No. 2 hvy. melting | 40.00 to 40.50 |
| RR. scrap rails | 55.50 to 56.50 |
| Rails 2 ft and under | 62.50 to 63.50 |
| No. 1 comp'd bundles | 40.00 to 40.50 |
| Hand bdld. new shts | 40.00 to 40.50 |
| Hvy. axle turn. | 41.50 to 42.00 |
| Hvy. steel forge turn | 41.50 to 42.00 |
| Mach. shop turn | 35.50 to 36.00 |
| Shoveling turn. | 38.00 to 38.50 |
| Mixed bor. and turn | 35.50 to 36.00 |
| Cast iron boring | 38.00 to 38.50 |
| No. 1 cupola cast. | 63.00 to 65.00 |
| Hvy. breakable cast | 52.50 to 53.50 |
| Malleable | 77.00 to 78.00 |
| RR. knuck. and coup | 54.75 to 55.75 |
| RR. coil springs | 54.50 to 55.50 |
| RR. leaf springs | 54.50 to 55.50 |
| Rolled steel wheels | 54.50 to 55.50 |
| Low phos. | 47.50 to 48.00 |

## CHICAGO

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $39.00 to $39.50 |
| No. 2 hvy. melting | 39.00 to 39.50 |
| No. 1 bundles | 39.00 to 39.50 |
| No. 2 dealers' bundles | 39.00 to 39.50 |
| Bundled mach. shop turn. | 37.00 to 37.50 |
| Galv. bundles | 35.00 to 35.50 |
| Mach. shop turn. | 34.00 to 34.50 |
| Short shov. turn. | 35.50 to 36.50 |
| Cast iron borings | 36.00 to 37.00 |
| Mix. borings & turn. | 34.00 to 34.50 |
| Low phos. hvy, forge | 48.00 to 50.00 |
| Low phos. plates | 45.00 to 46.00 |
| No. 1 RR. hvy. melt | 41.25 to 41.75 |
| Rerolling rails | 53.00 to 54.00 |
| Miscellaneous rails | 51.00 to 52.00 |
| Angles & splice bars | 53.00 to 54.00 |
| Locomotive tires, cut | 54.00 to 55.00 |
| Cut bolster & side frames | 49.00 to 51.00 |
| Standard stl. car axles | 59.00 to 60.00 |
| No. 3 steel wheels | 51.00 to 52.00 |
| Couplers & knuckles | 54.00 to 55.00 |
| Rails, 2 ft and under | 56.00 to 57.00 |
| Malleable | 76.00 to 78.00 |
| No. 1 mach. cast | 70.00 to 73.00 |
| No. 1 agricul. cast | 60.00 to 63.00 |
| Heavy breakable cast. | 51.00 to 52.00 |
| RR. grate bars | 60.00 to 65.00 |
| Cast iron brake shoes | 58.00 to 59.00 |
| Cast iron carwheels | 58.00 to 59.00 |

## CINCINNATI

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $38.50 to $39.50 |
| No. 2 hvy. melting | 38.50 to 39.50 |
| No. 1 bundles | 38.50 to 39.50 |
| No. 2 bundles | 38.50 to 39.50 |
| Mach. shop turn. | 33.00 to 33.50 |
| Shoveling turn. | 35.00 to 35.50 |
| Cast iron borings | 32.50 to 33.00 |
| Mixed bor. & turn | 32.50 to 33.00 |
| Low phos., plate | 46.00 to 48.00 |
| No. 1 cupola cast | 63.00 to 64.00 |
| Hvy. breakable cast | 53.00 to 54.00 |
| Rails 18 in. & under | 60.00 to 61.00 |
| Rails random length | 51.00 to 52.00 |
| Drop broken | 66.00 to 68.00 |

## BOSTON

**Dealers' buying prices, per gross ton, f.o.b. Boston**

| | |
|---|---|
| No. 1 hvy. melting | $31.65 to $31.90 |
| No. 2 hvy. melting | 31.65 to 31.90 |
| Nos. 1 and 2 bundles | 31.65 to 31.90 |
| Busheling | 31.65 to 31.90 |
| Shoveling turn. | .... 28.90 |
| Machine shop trun. | .... 26.90 |
| Mixed bor. & turn. | .... 26.90 |
| Cl'n cast chem. bor. | 38.00 to 39.00 |
| No. 1 machinery cast | 55.00 to 57.00 |
| No. 2 machinery cast | 53.00 to 54.00 |
| Heavy breakable cast | 52.00 to 53.00 |
| Stove plate | 52.00 to 53.00 |

## DETROIT

**Per gross ton, brokers' buying prices f.o.b. cars:**

| | |
|---|---|
| No. 1 hvy. melting | .... $35.50 |
| No. 2 hvy. melting | .... 35.50 |
| No. 1 bundles | .... 35.50 |
| New busheling | .... 35.50 |
| Flashings | .... 35.50 |
| Mach. shop turn. | $29.00 to 29.50 |
| Shoveling turn. | 30.00 to 30.50 |
| Cast iron borings | 30.00 to 30.50 |
| Mixed bor. & turn. | 28.50 to 29.00 |
| Low phos. plate | 39.50 to 40.50 |
| No. 1 cupola cast | 55.00 to 57.00 |
| Heavy breakable cast. | 48.00 to 52.00 |
| Stove plate | 50.00 to 52.00 |
| Automotive cast | 55.00 to 57.00 |

## PHILADELPHIA

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $42.00 to $43.00 |
| No. 2 hvy. melting | 38.50 to 39.00 |
| No. 1 bundles | 42.00 to 43.00 |
| No. 2 bundles | 38.50 to 39.00 |
| Mach. shop turn. | 34.50 to 35.00 |
| Shoveling turn. | 34.50 to 35.00 |
| Mixed bor. & turn. | 34.50 to 35.00 |
| Clean cast chemical bor. | 42.00 to 44.00 |
| No. 1 machinery cast | 66.00 to 68.00 |
| No. 1 mixed yard cast | 62.00 to 63.00 |
| Hvy. breakable cast. | 63.00 to 64.00 |
| Clean auto cast. | 65.00 to 66.00 |
| Hvy. axle forge turn | 44.00 to 45.00 |
| Low phos. plate | 47.00 to 48.00 |
| Low phos. punchings | 47.00 to 48.00 |
| Low phos. bundles | 45.00 to 46.00 |
| RR. steel wheels | 52.00 to 53.00 |
| RR. coil springs | 52.00 to 53.00 |
| RR. malleable | 75.00 to 78.00 |
| Cast iron carwheels | 68.00 to 70.00 |

## ST. LOUIS

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $41.00 to $42.00 |
| No. 2 hvy. melting | 37.50 to 38.50 |
| Bundled sheets | 37.50 to 38.50 |
| Mach. shop turn. | 33.00 to 33.50 |
| Locomotive tires, uncut | 46.00 to 47.00 |
| Mis. std. sec. rails | 46.50 to 47.50 |
| Steel angle bars | 50.00 to 51.00 |
| Rails 3 ft and under | 52.00 to 53.00 |
| RR. steel springs | 48.50 to 49.50 |
| Steel car axles | 54.00 to 55.00 |
| Grate bars | 60.00 to 62.00 |
| Brake shoes | 58.00 to 60.00 |
| Malleable | 71.00 to 72.00 |
| Cast iron car wheels | 61.00 to 62.00 |
| No. 1 machinery cast | 65.00 to 67.00 |
| Hvy. breakable cast | 58.00 to 59.00 |

## BIRMINGHAM

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy, melting | .... $37.50 |
| No. 2 hvy, melting | .... 37.50 |
| No. 2 bundles | .... 37.50 |
| No. 1 busheling | .... 37.50 |
| Long turnings | $25.00 to 26.00 |
| Shoveling turnings | 27.00 to 28.00 |
| Cast iron borings | 26.00 to 27.00 |
| Bar crops and plate | 42.50 to 43.50 |
| Structural and plate | 42.50 to 43.50 |
| No. 1 cupola cast. | 64.00 to 67.00 |
| Stove plate | 55.00 to 58.00 |
| No. 1 RR. hvy, melt. | 38.50 to 40.00 |
| Steel axles | 38.00 to 39.00 |
| Scrap rails | 44.00 to 45.00 |
| Rerolling rails | 51.00 to 53.00 |
| Angles & splice bars | 51.00 to 53.00 |
| Rails 3 ft & under | 52.00 to 55.00 |
| Cast iron carwheels | 48.00 to 50.00 |

## YOUNGSTOWN

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $40.00 to $40.50 |
| No. 2 hvy. melting | 40.00 to 40.50 |
| Mach. shop turn. | 35.00 to 35.50 |
| Short shov. turn. | 37.00 to 37.50 |
| Cast iron borings | 36.00 to 36.50 |
| Low phos. | 45.00 to 45.50 |

## NEW YORK

**Brokers' buying prices per gross ton, on cars:**

| | |
|---|---|
| No. 1 hvy. melting | $36.50 to $37.50 |
| No. 2 hvy. melting | .... 34.50 |
| No. 2 bundles | .... 34.50 |
| Mach. shop turn. | 29.00 to 29.50 |
| Mixed bor. & turn. | 29.00 to 29.50 |
| Shoveling turn. | 31.00 to 32.00 |
| No. 1 cupola cast | 56.00 to 57.00 |
| Clean auto cast | 56.00 to 57.00 |
| Hvy. breakable cast | 55.00 to 56.00 |
| Charging box cast | 55.00 to 56.00 |
| Unstrp. motor blks | 52.00 to 53.00 |
| Cl'n cast chem. bor. | 34.50 to 35.50 |

## BUFFALO

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy, melting | $39.75 to $45.00 |
| No. 2 hvy. melting | .... 39.75 |
| No. 1 bundles | .... 39.75 |
| No. 2 bundles | .... 39.75 |
| No. 1 busheling | .... 39.75 |
| Mach. shop turn. | 34.75 to 35.00 |
| Shoveling turn. | 35.00 to 36.00 |
| Cast iron borings | .... 35.75 |
| Mixed bor. & turn. | .... 34.75 |
| No. 1 cupola cast | 64.00 to 65.00 |
| Mixed cupola cast. | 62.00 to 63.00 |
| Charging box cast. | 56.00 to 57.00 |
| Stove plate | 62.00 to 64.00 |
| Clean auto cast. | 62.00 to 64.00 |
| RR. malleable | 70.00 to 75.00 |
| Small indl. malleable | 47.00 to 49.00 |
| Low phos. plate | 44.75 to 46.00 |
| Scrap rails | 50.00 to 52.00 |
| Rails 3 ft & under | 57.00 to 58.00 |
| RR steel wheels | 51.00 to 52.00 |
| Cast iron carwheels | 51.00 to 52.00 |
| RR. coil & leaf spgs. | 51.00 to 52.00 |
| RR. knuckles & coup. | 51.00 to 52.00 |

## CLEVELAND

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $39.50 to $40.00 |
| No. 2 hvy. melting | 39.50 to 40.00 |
| No. 1 bundles | 39.50 to 40.00 |
| No. 1 busheling | 39.50 to 40.00 |
| Drop forge flashings | 39.50 to 40.00 |
| Mach. shop turn. | 34.50 to 35.00 |
| Shoveling turn. | 35.50 to 36.00 |
| Steel axle turn. | 39.50 to 40.00 |
| Cast iron borings | 35.50 to 36.00 |
| Mixed bor. & turn. | 35.50 to 36.00 |
| Low phos. | 44.50 to 45.00 |
| No. 1 machinery cast. | 65.00 to 70.00 |
| Malleable | 73.00 to 75.00 |
| RR. cast. | 70.00 to 73.00 |
| Railroad grate bars | 60.00 to 62.00 |
| Stove plate | 60.00 to 62.00 |
| RR. hvy. melting | 40.00 to 40.50 |
| Rails 3 ft & under | 60.00 to 61.00 |
| Rails 18 in. & under | 62.00 to 63.00 |

## SAN FRANCISCO

**Per gross ton f.o.b. shipping point:**

| | |
|---|---|
| No. 1 hvy. melting | .... $25.00 |
| No. 2 hvy. melting | .... 25.00 |
| No. 2 bales | .... 25.00 |

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 3 bales | .... $19.50 |
| Mach. shop turn. | .... 16.00 |
| Elec. furn. 1 ft under | $32.00 to 34.00 |
| No. 1 cupola cast. | 40.00 to 43.00 |
| RR. hvy. melting | .... 26.00 |

## LOS ANGELES

**Per gross ton f.o.b. shipping point:**

| | |
|---|---|
| No. 1 hvy. melting | .... $25.00 |
| No. 2 hvy. melting | .... 25.00 |
| No. 1 bales | .... 25.00 |
| No. 2 bales | .... 25.00 |
| No. 3 bales | .... 19.00 |
| Mach. shop turn. | .... 17.50 |
| No. 1 cupola cast. | $45.00 to 50.00 |
| RR. hvy. melting | .... 26.00 |

## SEATTLE

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 & No. 2 hvy. melt. | .... $26.00 |
| Elec. furn. 1 ft and under | .... 30.00 |
| No. 1 cupola cast. | .... 40.00 |
| RR. hvy. melting | .... 28.00 |

## HAMILTON, ONT.

**Per gross ton delivered to consumer: Cast grades f.o.b. shipping point**

| | |
|---|---|
| Heavy melting | $23.00* |
| No. 1 bundles | 22.00* |
| No. 2 bundles | 21.50* |
| Mechanical bundles | 20.00* |
| Mixed steel scrap | 19.00* |
| Mixed borings and turnings | 17.00* |
| Rails, remelting | 22.00* |
| Rails, rerolling | 26.00* |
| Bushelings | 17.00* |
| Bushelings, new fact, prep'd | 21.00* |
| Bushelings, new fact, unprep'd | 16.00* |
| Short steel turnings | 17.00* |
| No. 1 cast | $42.00 to 46.00 |
| No. 2 cast | 35.00 to 37.00 |

*Ceiling Price.

# NONFERROUS METALS

. . . News and Market Activities

## Anaconda Will Expand Chile Mine Operations

*New York*

• • • **The Chile Exploration** Co., a subsidiary of Anaconda Copper Mining Co., has completed negotiations with the government of Chile for the expenditure of $130 million for new plants and facilities at the company's operating site in that country. According to the announcement of the Chilean Finance Minister, which has been confirmed by Anaconda officials, the agreement calls for an initial expenditure of $60 million over a 4-year period for new facilities to treat increasing tonnages of copper bearing sulfide ores. At present, the company is treating only oxidized ores.

Production of copper by the Chile Copper Co. is running at the rate of 225,000 tons a year. The new plants should permit the company to produce 270,000 tons a year. The Chuquicamata ore body of the Chile Copper Co. is said to be the richest known reserve in the world. Estimates indicate that it contains at least a billion tons of ore, the bulk of which is in sulfides.

A statement by company officials indicates that the agreement covers matters involved in the safe investment of capital by the company in Chile.

"The installation which is now contemplated and which should be in operation by 1952, will supplement production from the present oxide plant and will consist of a flotation concentrator and smelter capable of treating 25 thousand tons of sulfide ore per day to maintain a production of 540 million pounds of copper per year. The estimated cost, including plant requirements, additional housing and auxiliary facilities in connection wth the installation referred to, involve an expenditure of approximately $60 million. Additional units to maintain ore, increasing the output of copper will be added after the oxide ore diminishes and as existing conditions and the demand for copper warrant.

"Ultimately the plans provide for a plant for the treatment of sulfide ores of approximately 48 units at an estimated cost of $130 million."

•

## Refiners' Lower Copper

*New York*

• • • **Refiners have** reduced their buying prices for copper scrap ¼¢, but this has not been reflected by dealers' buying prices yet because of outstanding brokers' orders at the higher price. The drop in refiners' prices is a further indication of the increasing easiness in copper scrap supplies. The increase in the price of antimony has had no effect on prices of type metals because of the inactivity of these grades. Soft scrap lead prices have increased by ½¢ a lb due to the tightness of this metal. New zinc clips and old zinc prices are ½¢ higher.

•

## Study New Canadian Plant

*New York*

• • • **The Aluminum Co.** of Canada is studying the possibility of establishing a new reduction plant on the coast of British Columbia. Officials have been studying the possibilities of several sites for a hydroelectric installation, the most favorable of which seems to be the Bute Inlet northwest of Vancouver. Estimates place the power potential of this area at more than a million hp.

•

## Tin

*New York*

• • • **Estimates of** world mine production of tin made at the Washington meeting of the International Tin Study Group were 150,000 long tons in 1948, 170,000 in 1949 and 200,000 in 1950. These figures are downward revisions of the Group's estimates at the 1947 meeting, due largely to the difficulties encountered in rehabilitating the Far Eastern tin mines. Estimates of potential industrial consumption of tin, if freely available and unrestricted by controls, were set at 190,000 tons a year during the same period.

At the meeting the delegates agreed to recommend to member governments the setting up of a working party to examine the appropriateness and practicability of framing an intergovernmental agreement on tin, conforming to the general spirit and principles of the Charter of the International Trade Organization.

•

## Antimony

• • • **The price increase** of 2¢ per lb which National Lead Co. put into effect on May 22 has been followed by the other domestic producers. This development brings the price at Laredo, Tex., to 35¢ per lb. Antomony is no longer being produced in China, the principal prewar source, because of the inflation and war being waged there. United States consumers are dependent now principally on domestic production which is in short supply and still controlled by the Dept. of Commerce. Some metal is still being allocated out of the stockpile held by Office of Metals Reserve, which in April amounted to 6000 tons.

### Nonferrous Metals Prices

| | May 26 | May 27 | May 28 | May 29 | June 1 |
|---|---|---|---|---|---|
| Copper, electro, Conn. | 21.50 | 21.50 | 21.50 | 21.50 | 21.50 |
| Copper, Lake, Conn. | 21.625 | 21.625 | 21.625 | 21.625 | 21.625 |
| Tin, Straits, New York | 94.00 | 94.00 | 94.00 | 94.00 | 94.00 |
| Zinc, East St. Louis | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| Lead, St. Louis | 17.30 | 17.30 | 17.30 | 17.30 | 17.30 |

### Monthly Average Prices

• • • The average prices of the major nonferrous metals in May based on quotations appearing in The Iron Age, were as follows:

| | Cents Per Pound |
|---|---|
| Electrolytic copper, Conn. Valley | 21.50 |
| Lake copper, Conn. Valley | 21.625 |
| Straits tin, New York | 94.00 |
| Zinc, East St. Louis | 12.00 |
| Zinc, New York | 12.644 |
| Lead, St. Louis | 17.30 |
| Lead, New York | 17.50 |

# Primary Metals

*(Cents per lb. unless otherwise noted)*

Aluminum, 99+%, 10,000 lb, f.o.b shipping point, freight allowed.... 15.00
Aluminum pig, f.o.b. shipping point 14.00
Antimony, American, Laredo, Tex.. 35.00
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be.....$20.50
Beryllium aluminum 5% Be, dollars per lb contained Be.....$40.00
Cadmium, del'd ..... $1.75
Cobalt, 97-99% (per lb).....$1.65 to $1.72
Copper electro, Conn. Valley..... 21.50
Copper, lake, Conn. Valley.....21.625
Gold, U. S Treas., dollars per oz...$35.00
Indium, 99.8%, dollars per troy oz... $2.25
Iridium, dollars per troy oz...$105 to $115
Lead, St. Louis ..... 17.30
Lead, New York ..... 17.50
Magnesium, 99.8+%, f.o.b. Freeport, Tex. ..... 20.50
Magnesium, sticks, carlots..... 34.50
Mercury, dollars per 76-lb flask, f.o.b. New York.....$75 to $77
Nickel, electro, f.o.b. New York.... 36.56
Palladium, dollars per troy oz.....$24.00
Platinum, dollars per troy oz...$98 to $101
Silver, New York, cents per oz.....74.625
Tin, Grade A, New York..... 94.00
Zinc, East St. Louis..... 12.00
Zinc, New York ..... 12.65
Zirconium copper, 6 pct Zr, per lb contained Zr. ..... $8.75

# Remelted Metals

## Brass Ingot

*(Cents per lb, in carloads)*

85-5-5-5 ingot
No. 115 ..... 19.00–19.25
No. 120 ..... 18.50–18.75
No. 123 ..... 18.00–18.25
80-10-10 ingot
No. 305 ..... 24.25
No. 315 ..... 21.75
88-10-2 ingot
No. 210 ..... 30.00
No. 215 ..... 28.00
No. 245 ..... 22.25–22.75
Yellow ingot
No. 405 ..... 15.25–16.00
Manganese bronze
No. 421 ..... 18.00

## Aluminum Ingot

*(Cents per lb, lots of 30,000 lb)*

**95-5 aluminum-silicon alloys**
0.30 copper, max. ..... 21.75
0.60 copper, max. ..... 21.50
Piston alloys (No. 122 type)... 20.00
No. 12 alum, (No. 2 grade).... 19.75
108 alloy ..... 20.00
195 alloy ..... 19.75
13 alloy ..... 21.50
AXS-679 ..... 20.00

**Steel deoxidizing aluminum, notch-bar granulated or shot**
Grade 1—95 pct.-95½ pct..... 20.50–21.00
Grade 2—92 pct-95 pct..... 19.50–20.00
Grade 3—90 pct-92 pct..... 19.00–19.50
Grade 4—85 pct-90 pct..... 18.50–19.00

# Electroplating Supplies

## *Anodes*

*(Cents per lb, f.o.b. shipping point in 500 lb lots)*

Copper, frt. allowed
Cast, oval, 15 in. or longer..... 37⅝
Electrodeposited ..... 32⅝
Rolled, oval, straight, delivered... 33.09
Brass, 80-20, frt. allowed
Cast, oval, 15 in. or longer..... 33⅜
Zinc, cast, 99 99 ..... 20.50
Nickel 99 pct plus, frt. allowed
Cast ..... 51
Rolled, depolarized ..... 52
Silver 999 fine
Rolled, 1000 oz lots per troy oz... 67¼

## *Chemicals*

*(Cents per lb, f.o.b. shipping point)*

Copper cyanide, 100 lb drum..... 43.00
Copper sulfate, 99.5, crystals, bbls.. 11.50
Nickel salts, single, 425 lb bbls. frt. allowed ..... 14.50
Silver cyanide, 100 oz. lots, per oz. 54.00
Sodium cyanide, 96 pct domestic, 100 lb drums ..... 15.00
Zinc cyanide, 100 lb drums..... 34.00
Zinc sulfate, 89 pct, granules, bbls, frt. allowed ..... 7.75

# Mill Products

## Aluminum

*(Base prices, cents per pound, base 30,000 lb., f.o.b. shipping point, freight allowed.)*

**Flat Sheet: 0.188 in., 2S, 3S, 24¢; 4S, 61S-O, 25.8¢; 52S, 27.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢. 0.081 in.; 2S, 3S, 25¢; 4S, 61S-O, 27.1¢; 52S, 29¢; 24S-O, 24S-OAL, 27.7¢; 75S-O, 75S-OAL, 34.3¢. 0.032 in.; 2S, 3S, 26.4¢; 4S, 61S-O, 30.1¢; 52S, 32.6¢; 24S-O, 24S-OAL, 34.2¢; 75S-O, 75S-OAL, 43.1¢.**

**Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 4S-F, 23.2¢; 52S, 24.2¢; 61S-O, 23.8¢; 24S-F,24S-FAL, 24.2¢; 75S, 75S-AL, 30.5¢.**

**Extruded Solid Shapes: Shape factors 1 to 4; 31¢ to 59¢; 11 to 13, 31.9¢ to 69c; 23 to 25, 33.4c to 90¢; 35 to 37, 40.8¢ to $1.25; 47 to 49, 58.7¢ to $1.84.**

**Extruded Round Rod, Square, Hex, Octagonal Bar: ¼ in. and over, 27¢ to 38¢; ½ to ¾ in., 28¢ to 40.5¢; ⅝ to ½ in., 29c to 43c; ¼ to ⅜ in., 30¢ to 46.5¢; ⅞ to ⅝ in., 32.5¢ to 53.5¢; 9/64 to ⅜ in., 35.5¢ to 62¢.**

**Rolled Rod: 1.064 to 4.5 in., 2S, 3S, 30¢ to 26.5¢; Cold-finished rod, 0.375 to 3.5 in., 2S, 3S, 32¢ to 28¢.**

**Screw Machine Stock: Drawn, ⅛ to 1½ in., 11S-T3, R317-T4, 45¢ to 34¢; cold-finished, ⅜ to 1½ in., 11S-T3, 33¢ to 31¢; ⅝ to 2 in., R317-T4, 33¢ to 30¢; rolled, 1⅝ to 3 in., 11S-T3, 31¢ to 28.5¢; 2¼ to 3⅜ in., R317-T4, 29.5¢ to 28.5¢. Base 5000 lb.**

**Drawn Wire: coiled, 0.051 to 0.374 in.; 2S, 33¢ to 24¢ 52S, 40.5c to 29c; 56S, 42.5¢ to 34.5¢; 17S-T4, 46¢ to 31¢; 61S-T4, 41c to 30.5c; 75S-T6, 66¢ to 46¢.**

## Magnesium

*(Cents per lb, f.o.b. mill, freight allowed. Base quantity 30,000 lb.)*

**Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58c-60c; 10, 59c-61c; 12, 63-65c; 14, 69c-74c; 16, 76c-81c; 18, 84c-89c 20, 96c-$1.01; 22, $1.22-$1.31; 24, $1.62-$1.75. Specification grade higher.**

**Extruded Round Rod: M, diam. in., ¼ to 0.311, 58¢; ½ to ¾, 46¢; 1¼ to 1.749, 43¢; 2½ to 5, 41¢. Other alloys higher.**

**Extruded Square, Hex. Bar: M, size across flats, in., ¼ to 0.311, 61¢; ½ to 0.749, 48¢ 1¼ to 1.749, 44¢; 2½ to 4, 42¢. Other alloys higher.**

**Extruded Solid Shapes, Rectangles: M, in weight per ft, for perimeters of less than size indicated, 1.00 to 0.11 lb. per ft, per. up to 3.5 in., 55¢; 0.22 to 0.25 lb per ft, per. up to 5.9 in., 51¢; 0.50 to 0.59 lb per ft, per. up to 8.6 in., 47¢; 1.8 to 2.59 lb per ft, per. up to 19.5 in., 44¢; 4 to 6 lb per ft, per. up to 28 in., 43¢. Other alloys higher.**

**Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to ⅝ $1.14; ⅝ to ⅞, $1.02; ½ to ⅞, 76¢; 1 to 2 in., 65¢. 0.065 to 0.082, ⅜ to ⅞, 85¢; ⅝ to ⅞, 62¢; 1 to 2 in., 57¢. 0.165 to 0.219, ⅝ to ⅞, 54.5¢; 1 to 2 in., 53¢; 3 to 4 in., 49¢. Other alloys higher.**

## Nickel and Monel

*(Cents per lb, f.o.b. mill)*

| | Nickel | Monel |
|---|---|---|
| Sheets, cold-rolled | 54 | 43 |
| No. 35 sheets | | 41 |
| Strip, cold-rolled | 60 | 44 |
| Rod | | |
| Hot-rolled | 50 | 39 |
| Cold-drawn | 55 | 44 |
| Angles, hot-rolled | 50 | 39 |
| Plates | 52 | 41 |
| Seamless tubes | 83 | 71 |
| Shot and blocks | | 31 |

## Copper, Brass, Bronze

*(Cents per pound, freight prepaid on 200 lb)*

| | Extruded Shapes | Rods | Sheets |
|---|---|---|---|
| Copper | 33.53 | .... | 33.68 |
| Copper, hot-rolled | .... | 30.03 | .... |
| Copper, drawn | .... | 31.03 | .... |
| Low brass | 34.36* | 31.39 | 31.70 |
| Yellow brass | 32.92* | 29.85 | 30.16 |
| Red brass | 34.89* | 31.92 | 32.23 |
| Naval brass | 30.28 | 29.03 | 34.97 |
| Leaded brass | 28.64 | 24.69 | .... |
| Commercial bronze | 35.68* | 32.96 | 33.27 |
| Manganese bronze | 33.87 | 32.37 | 38.47 |
| Phosphor bronze, 5 pct | 53.95* | 52.95 | 52.70 |
| Muntz metal | 29.80 | 28.55 | 32.99 |
| Everdur, Herculoy, Olympic, etc. | 37.24 | 37.50 | 38.56 |
| Nickel silver, 20 pct. | 41.80 | 42.68 | 40.54 |
| 5 pct | .... | .... | 38.98 |
| Architectural bronze | 28.61 | .... | .... |

*Seamless tubing.

# Scrap Metals

## Brass Mill Scrap

*(Cents per pound; add 1¢ per lb for shipments of 15,000 lb or more.)*

| | Heavy | Turnings |
|---|---|---|
| Copper | 19⅛ | 18⅝ |
| Yellow brass | 15⅝ | 14⅝ |
| Red brass | 17½ | 16⅝ |
| Commercial bronze | 17⅝ | 16⅞ |
| Manganese bronze | 15¼ | 14⅝ |
| Leaded brass rod ends | 15¾ | .... |

## Custom Smelters' Scrap

*(Cents per pound, carload lots, delivered to refinery.)*

No. 1 copper, wire..... 18.50
No. 2 copper, wire..... 17.50
Light copper ..... 16.50
Refinery brass ..... 16.50–16.75*
*Dry copper content.

## Ingot Makers' Scrap

*(Cents per pound, carload lots, delivered to producer.)*

No. 1 copper, wire..... 18.25
No. 2 copper, wire ..... 17.25
Light copper ..... 16.25
No. 1 composition..... 14.50
No. 1 comp. turnings..... 14.00
Rolled brass ..... 11.00
Brass pipe ..... 11.25
Radiators ..... 12.00
Heavy yellow brass..... 10.50

*Aluminum*

Mixed old cast..... 11.00
Mixed old clips..... 11.00
Mixed turnings ..... 6.00
Pots & pans ..... 11.75
Low copper ..... 12.00

## Dealers' Scrap

*(Dealers' buying prices, f.o.b. New York in cents per pound.)*

### Copper and Brass

**No. 1 heavy copper and wire..** 16½—17
**No. 2 heavy copper and wire..** 15½—16
**Light copper** ..... 14¼—14⅝
Auto radiators (unsweated)... 9¾—10¼
No. 1 composition ..... 12½—13
No. 1 composition turnings..... 12 —12½
Clean red car boxes..... 9½— 9⅝
Cocks and faucets..... 9½—10
**Mixed heavy yellow brass**..... 8 — 8¼
Old rolled brass ..... 9½— 9⅝
**Brass pipe** ..... 10 —10¼
**New soft brass clippings**..... 12¼—12⅝
**Brass rod ends** ..... 10 —10½
**No. 1 brass rod turnings**..... 9½—10

### Aluminum

Alum. pistons with struts..... 6 — 6½
Aluminum crankcases ..... 8¾— 9
2S aluminum clippings ..... 10 —10½
Old sheet & utensils ..... 9 — 9½
Dry borings and turnings..... 3½— 4
Misc. cast aluminum ..... 8½— 9
Dural clips (24S) ..... 8½— 9

### Zinc

New zinc clippings ..... 8 — 8½
Old zinc ..... 6 — 6½
**Zinc routings** ..... 3 — 3½
**Old die cast scrap**..... 4 — 4½

### Nickel and Monel

Pure nickel clippings ..... 17 —18
Clean nickel turnings ..... 13 —14
Nickel anodes ..... 17 —18
Nickel rod ends ..... 17 —18
**New Monel clippings** ..... 12 —13
Clean Monel turnings ..... 8 — 9
**Old sheet Monel** ..... 10 —10½
**Old Monel castings** ..... 7½— 8
Inconel clippings ..... 9 —10
**Nickel silver clippings, mixed** 8 — 8½
**Nickel silver turnings, mixed** 6½— 7

### Lead

Soft scrap lead ..... 15½—16
Battery plates (dry) ..... 9½— 9½

### Magnesium Alloys

Segregated solids ..... 8 — 9
Castings ..... 4½— 5½

### Miscellaneous

Block tin ..... 75 —77
No. 1 pewter ..... 60 —62
No. 1 auto babbitt ..... 45 —47
Mixed common babbitt ..... 14¼—14⅝
Solder joints ..... 17¾—17⅝
Siphon tops ..... 45 —47
Small foundry type ..... 17½—18
Monotype ..... 16¼—16⅝
Lino. and stereotype ..... 15½—16
Electrotype ..... 13½—14
New type shell cuttings..... 14½—15
Hand picked type shells..... 6½— 7
Lino and stereo dross..... 8 — 8½
Electro dross ..... 6 — 6½

# Comparison of Prices . .

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

*Steel prices on this page are the average of various f.o.b. quotations of major basing points: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.*

| Flat-Rolled Steel: (cents per pound) | June 1, 1948 | May 25, 1948 | May 4, 1948 | June 3, 1947 |
|---|---|---|---|---|
| Hot-rolled sheets | 2.775 | 2.775 | 2.775 | 2.50 |
| Cold-rolled sheets | 3.495 | 3.495 | 3.495 | 3.20 |
| Galvanized sheets (10 ga.) | 3.913 | 3.913 | 3.913 | 3.55 |
| Hot-rolled strip | 2.775 | 2.775 | 2.775 | 2.50 |
| Cold-rolled strip | 3.535* | 3.535* | 3.535 | 3.20 |
| Plates | 2.93 | 2.93 | 2.93 | 2.65 |
| Plates wrought iron | 7.25 | 7.25 | 7.25 | 5.95 |
| Stain's c-r strip (No. 302) | 30.50 | 30.50 | 30.50 | 30.56 |
| **Tin and Terneplate:** (dollars per base box) | | | | |
| Tinplate (1.50 lb) cokes.. | $6.70 | $6.70 | $6.70 | $5.75 |
| Tinplate, electro (0.50 lb) | 5.90 | 5.90 | 5.90 | 5.05 |
| Special coated mfg. ternes | 5.80 | 5.80 | 5.80 | 4.90 |
| **Bars and Shapes:** (cents per pound) | | | | |
| Merchant bars | 2.875 | 2.875 | 2.875 | 2.60 |
| Cold-finished bars | 3.483 | 3.483 | 3.483 | 3.20 |
| Alloy bars | 3.213 | 3.213 | 3.213 | 3.05 |
| Structural shapes | 2.767 | 2.767 | 2.767 | 2.50 |
| Stainless bars (No. 302) | 26.00 | 26.00 | 26.00 | 26.00 |
| Wrought iron bars | 8.65 | 8.65 | 8.65 | 6.15 |
| **Wire:** (cents per pound) | | | | |
| Bright wire | 3.608 | 3.608 | 3.608 | 3.30 |
| **Rails:** (dollars per 100 lb) | | | | |
| Heavy rails | $2.725 | $2.725 | $2.725 | $2.50 |
| Light rails | 3.05 | 3.05 | 3.05 | 2.85 |
| **Semifinished Steel:** (dollars per gross ton) | | | | |
| Rerolling billets | $45.00† | $45.00† | $45.00† | $42.00 |
| Slabs, rerolling | 45.00† | 45.00† | 45.00† | 42.00 |
| Forging billets | 54.00† | 54.00† | 54.00† | 50.00 |
| Alloy blooms, billets, slabs | 66.00 | 66.00 | 66.00 | 61.00 |
| **Wire Rods and Skelp:** (cents per pound) | | | | |
| Wire rods | 3.133 | 3.133 | 3.133 | 2.55 |
| Skelp | 2.888 | 2.888 | 2.888 | 2.35 |

†Net ton * Corrected

| Pig Iron: (per gross ton) | June 1, 1948 | May 25, 1948 | May 4, 1948 | June 3, 1947 |
|---|---|---|---|---|
| No. 2, foundry, Phila. | $44.85 | $44.85 | $44.61 | $36.51 |
| No. 2, Valley furnace | 39.50 | 39.50 | 39.50 | 33.50 |
| No. 2, Southern Cin'ti | 45.47 | 45.47 | 43.28 | 34.75 |
| No. 2, Birmingham | 39.38 | 39.38 | 37.38 | 29.88 |
| No. 2, foundry, Chicago† | 39.00 | 39.00 | 39.00 | 33.00 |
| Basic del'd Philadelphia | 44.35 | 44.35 | 44.11 | 36.92 |
| Basic, Valley furnace | 39.00 | 39.00 | 39.00 | 33.00 |
| Malleable, Chicago† | 39.50 | 39.50 | 39.50 | 33.50 |
| Malleable, Valley | 39.50 | 39.50 | 39.50 | 33.50 |
| Charcoal, Chicago | 65.55 | 65.55 | 62.46 | 45.99 |
| Ferromanganese‡ | 145.00 | 145.00 | 145.00 | 135.00 |

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.
* Revised.

| Scrap: (per gross ton) | | | | |
|---|---|---|---|---|
| Heavy melt'g steel, P'gh. | $40.25 | $40.25 | $40.25 | $32.25 |
| Heavy mlt'g steel, Phila. | 42.50 | 42.50 | 41.75 | 31.50 |
| Heavy melt'g steel, Ch'go | 39.25 | 39.25 | 39.25 | 29.75 |
| No. 1, hy, comp. sh't, Det. | 35.50 | 35.50 | 35.50 | 27.00 |
| Low phos. Young'n | 45.25 | 45.25 | 45.25 | 35.75 |
| No. 1, cast, Pittsburgh | 64.00 | 64.00 | 64.00 | 36.50 |
| No. 1, cast, Philadelphia | 67.00 | 67.00 | 65.50 | 42.50 |
| No. 1, cast, Chicago | 71.50 | 71.50 | 71.50 | 39.75 |
| **Coke, Connellsville:** (per net ton at oven) | | | | |
| Furnace coke, prompt | $12.50 | $12.50 | $12.50 | $10.50 |
| Foundry coke, prompt | 14.00 | 14.00 | 14.00 | 11.25 |
| **Nonferrous Metals:** (cents per pound to large buyers) | | | | |
| Copper, electro, Conn. | 21.50 | 21.50 | 21.50 | 22.00 |
| Copper, Lake Conn. | 21.625 | 21.625 | 21.625 | 21.625 |
| Tin, Grade A, New York | 94.00 | 94.00 | 94.00 | 80.00 |
| Zinc, East St. Louis | 12.00 | 12.00 | 12.00 | 10.50 |
| Lead, St. Louis | 17.30 | 17.30 | 17.30 | 14.80 |
| Aluminum, virgin | 15.00 | 15.00 | 15.00 | 15.00 |
| Nickel, electrolytic | 36.56 | 36.56 | 36.56 | 37.67 |
| Magnesium, ingot | 20.50 | 20.50 | 20.50 | 20.50 |
| Antimony, Laredo, Tex. | 35.00 | 35.00* | 33.00 | 33.00 |

*Revised

# Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled

| | FINISHED STEEL (Base Price) | PIG IRON | SCRAP STEEL |
|---|---|---|---|
| June 1, 1948 | 3.24473¢* per lb. | $40.53 per gross ton | $40.66 per gross ton |
| One week ago | 3.24473¢* per lb. | $40.53 per gross ton | $40.66 per gross ton |
| One month ago | 3.24473¢* per lb. | $40.11 per gross ton | $40.42 per gross ton |
| One year ago | 2.85664¢ per lb. | $33.15 per gross ton | $31.17 per gross ton |

* Corrected

| | HIGH | LOW | HIGH | LOW | HIGH | LOW |
|---|---|---|---|---|---|---|
| 1948 | 3.27585¢ Feb. 17 | 3.22566¢ Jan. 1 | $40.53 May 18 | $39.58 Jan. 6 | $41.83 Jan. 29 | $39.75 Mar. 9 |
| 1947 | 3.19541¢ Oct. 7 | 2.87118¢ Jan. 7 | 37.98 Dec. 30 | 30.14 Jan. 7 | 42.58 Oct. 28 | 29.50 May 20 |
| 1946 | 2.83599¢ Dec. 31 | 2.54490¢ Jan. 1 | 30.14 Dec. 10 | 25.37 Jan. 1 | 31.17 Dec. 24 | 19.17 Jan. 1 |
| 1945 | 2.44104¢ Oct. 2 | 2.38444¢ Jan. 2 | 25.37 Oct. 23 | 23.61 Jan. 2 | 19.17 Jan. 2 | 18.92 May 22 |
| 1944 | 2.30837¢ Sept. 5 | 2.21189¢ Oct. 5 | $23.61 | $23.61 | 19.17 Jan. 11 | 15.76 Oct. 24 |
| 1943 | 2.29176¢ | 2.29176¢ | 23.61 | 23.61 | $19.17 | $19.17 |
| 1942 | 2.28249¢ | 2.28249¢ | 23.61 | 23.61 | 19.17 | 19.17 |
| 1941 | 2.43078¢ | 2.43078¢ | $23.61 Mar. 20 | $23.45 Jan. 2 | $22.00 Jan. 7 | $19.17 Apr. 10 |
| 1940 | 2.30467¢ Jan. 2 | 2.24107¢ Apr. 16 | 23.45 Dec. 23 | 22.61 Jan. 2 | 21.83 Dec. 30 | 16.04 Apr. 9 |
| 1939 | 2.35367¢ Jan. 3 | 2.26689¢ May 16 | 22.61 Sept. 19 | 20.61 Sept. 12 | 22.50 Oct. 3 | 14.08 May 16 |
| 1938 | 2.58414¢ Jan. 4 | 2.27207¢ Oct. 18 | 23.25 June 21 | 19.61 July 6 | 15.00 Nov. 22 | 11.00 June 7 |
| 1937 | 2.58414¢ Mar. 9 | 2.32263¢ Jan. 4 | 23.25 Mar. 9 | 20.25 Feb. 16 | 21.92 Mar. 30 | 12.67 June 9 |
| 1936 | 2.32263¢ Dec. 28 | 2.05200¢ Mar. 10 | 19.74 Nov. 24 | 18.73 Aug. 11 | 17.75 Dec. 21 | 12.67 June 8 |
| 1935 | 2.07642¢ Oct. 1 | 2.06492¢ Jan. 8 | 18.84 Nov. 5 | 17.83 May 14 | 13.42 Dec. 10 | 10.33 Apr. 29 |
| 1934 | 2.15367¢ Apr. 24 | 1.95757¢ Jan. 2 | 17.90 May 1 | 16.90 Jan. 27 | 13.00 Mar. 13 | 9.50 Sept. 25 |
| 1933 | 1.95578¢ Oct. 3 | 1.75836¢ May 2 | 16.90 Dec. 5 | 13.56 Jan. 3 | 12.25 Aug. 8 | 6.75 Jan. 3 |
| 1932 | 1.89196¢ July 5 | 1.83901¢ Mar. 1 | 14.81 Jan. 5 | 13.56 Dec. 6 | 8.50 Jan. 12 | 6.43 July 5 |
| 1931 | 1.99626¢ Jan. 13 | 1.86586¢ Dec. 29 | 15.90 Jan. 6 | 14.79 Dec. 15 | 11.33 Jan. 6 | 8.50 Dec. 29 |
| 1930 | 2.25488¢ Jan. 7 | 1.97319¢ Dec. 9 | 18.21 Jan. 7 | 15.90 Dec. 16 | 15.00 Feb. 18 | 11.25 Dec. 9 |
| 1929 | 2.31773¢ May 28 | 2.26498¢ Oct. 29 | 18.71 May 14 | 18.21 Dec. 17 | 17.58 Jan. 29 | 14.08 Dec. 8 |

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

# Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound unless otherwise indicated. Extras apply. Delivered prices are minimum and do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 0.25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 20¢ per base box. (6) 18 gage and heavier. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb & over. (9) Carload lot in manufacturing trade. (10) Arbitrary delivered prices. (11) Hollowware enameling, gages 29 to 31 only. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only. (14) Kaiser Co. prices (15) from 0.035 to 0.075 in. thick by ¾ to 3½ in. wide. (16) Deliverd Los Angeles; add 0.55¢ per 100 lb for San Francisco. (17) Slab prices subject to negotiation in most cases. (18) 24 to 14 gage, up to 48 in.; 26 gage, up to 22 in.; 30 to 27 gage, up to 36 in.

| PRODUCTS | Prices at basing points apply only to the sizes and grades produced at those points. | | | | | | | | | | | | DELIVERED TO | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pittsburgh | Chicago | Gary | Cleveland | Birmingham | Buffalo | Youngstown | Sparrows Point | Granite City | Middletown, Ohio | | San Francisco, Los Angeles | Detroit[10] | New York | Philadelphia |
| INGOTS Carbon forging | $46.00 | Rerolling ingots—$36.00 per net ton f.o.b. mill (Spot market as $75 to $90 per gross ton) | | | | | | | | | | | | | |
| Alloy | $56.00 | | | | | | | | | | Canton = $56.00 | | | | |
| BILLETS, BLOOMS, SLABS Carbon, rerolling[17] | $45.00 | $45.00 | $45.00 | $47.00 | $45.00 | $45.00 | | $45.00 | | | | | | | |
| Carbon forging billets | $54.00 | $54.00 | $54.00 | $54.00 | $54.00 | $54.00 | (per net ton) | | | | | | | | |
| Alloy | $66.00 | $66.00 | | | | (Bethlehem, Massillon, Canton = $66.00) | | | | | | | | | |
| PIPE SKELP | 2.85 to 2.90 | | | | | | 2.90 | | | | | | | | |
| WIRE RODS | 2.80 to 3.55 | 2.80 to 3.80 | | 2.80 to 3.05 | 2.85 | | | | | | Worcester = 2.90 | 3.5245[13] | | | |
| SHEETS Hot-rolled[6] | 2.75 to 2.80 | 2.75 to 2.80 | 2.75 | 2.80 | 2.75 to 2.80 | 2.80 | 2.75 to 2.80 | 2.80 | | Ashland, Ky. = 2.80 | | 3.494[16] to 3.6875 | 2.96 to 3.01 | 3.18 to 3.31 | 3.06 to 3.24 |
| Cold-rolled[1] | 3.45 to 3.50 | 3.45 to 3.55 | 3.45 | 3.50 | | 3.55 | 3.55 | 3.55[18] | 3.65 | 3.50 | | | 3.66 | 3.93 to 4.01 | 3.81 to 3.94 |
| Galvanized (10 gage) | 3.85 | 3.95 | 3.85 to 3.95 | | 3.85 to 3.95 | | 3.95 | 3.95 | 4.05 | 3.95 | Ashland = 3.95 | 4.624[16] | | 4.31 | 4.21 |
| Enameling (12 gage) | 3.85 | 3.75 | 3.75 to 3.85 | 3.95 | | | 3.95 | | 4.05 | 3.85 | | | 4.11 to 4.16 | .31 | 4.34 |
| Long ternes[3] (10 gage) | 4.05 | | 4.05 | | | | | | | | | | | 4.61 | 4.54 |
| STRIP Hot-rolled[3] | 2.80 | 2.75 to 2.80 | 2.75 | 2.75 to 2.80 | 2.75 | | 2.75 to 2.80 | | | | | 3.554[16] to 3.9125 | 2.96 to 3.01 | 3.38 | 3.29 |
| Cold-rolled[4] | 3.50 | 3.55 to 3.65 | 3.55 | 3.45 to 3.50 | | | 3.55 | | | Worcester = 3.65) to 3.75 | | | 3.66 | 4.05 | 3.99 |
| TINPLATE Cokes, 1.50 lb,[5] base box | 6.70 | 6.70 | 6.70 | | 6.80 | | | 6.80 | 6.90 | (Warren, Ohio = $6.80) | | | | 7.18 | 7.06 |
| Electrolytic 0.25, 0.50, 0.75 lb, box | Deduct $1.00, 80¢ and 60¢ respectively from 1.50 lb coke base box price. | | | | | | | | | | | | | | |
| TERNES, MFG., special coated | Deduct 90¢ from 1.50 lb coke base box price. | | | | | | | | | | | | | | |
| BLACKPLATE, CANMAKING 55-70 lb, 75-95 lb, 100-128 lb | Deduct $1.60, $1.70 and $1.60 respectively from 1.50 lb coke base box price. | | | | | | | | | | | | | | |
| BLACKPLATE, h.e., 29 ga.[11] | 4.65 | 4.65 | 4.65 | | | | | 4.75 | 4.85 | | | | | 5.13 | 5.01 |
| BARS Carbon Steel | 2.85 to 2.90 | 2.85 to 2.90 | 2.85 | 2.90 | 2.85 to 2.90 | 2.90 | 2.85 to 2.90 | | | | | 3.579[16] to 3.629[16] | 3.06 to 3.11 | 3.40 | 3.34 |
| Reinforcing (billet)[7] | 2.70 to 2.80 | 2.70 to 2.80 | 2.70 | | 2.70 | | 2.70 | 2.75 | | | | 3.325[16] | | 3.13 | 3.01 |
| Cold-finished[1] | 3.45 to 3.55 | 3.45 to 3.55 | | 3.45 | | | | | | | | | 3.60 to 3.76 | 4.01 | 3.94 |
| Alloy, hot-rolled | 3.20 | 3.20 to 3.30 | 3.20 | | | 3.30 | 3.20 | Bethlehem, Massillon, Canton = 3.30 | | | | | | 3.58 | 3.48 |
| Alloy, cold-drawn | 4.00 to 4.10 | 4.00 to 4.10 | | 4.00 | | 4.10 | | Massillon, Canton = 4.10 | | | | | | 4.56 | 4.49 |
| PLATE Carbon steel[12] | 2.90 to 2.95 | 2.90 to 2.95 | 2.90 to 2.95 | 2.95 | 2.85 to 2.90 | | 2.11 to 2.95 | Coatesville = 3.45, Claymont = 3.65 2.95 Geneva, Utah = 2.90 | | | | 3.8375[16] | | 3.33 | 3.21 |
| Floor plates | 4.05 | 3.95 to 4.05 | 3.95 | 4.05 | | | | | | | | | | 4.61 | 4.54 |
| Alloy | 3.70 | 3.70 | 3.70 | | | | | | Coatesville = 4.80 | | | | | 4.28 | 4.19 |
| SHAPES, Structural | 2.75 | 2.75 to 2.80 | 2.75 to 2.80 | | 2.75 | | Bethlehem = 2.80, Geneva, Utah = 2.75 | | | | | 3.424[16] to 3.49 | | 3.6 | 2.98 |
| MANUFACTURERS' WIRE[9] Bright | 3.45 to 3.80 | 3.45 to 4.05 | | 3.45 | 3.45 to 3.55 | | | | | Worcester = 3.55 Duluth = 3.50 | | 4.4645[13] | | 3.95 | 3.94 |
| Spring (high carbon) | 1.50 | 4.50 | | 4.50 | | | | | | Worcester = 4.60 Trenton, Duluth = 4.75 | | 5.5345[13] | | 5.00 | 4.99 |
| PILING, Steel sheet | 3.30 | 3.30 | | | | 3.30 | | | | | | | | 3.83 | 3.79 |

## CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

| Basing Point | Chromium Nickel | | Straight Chromium | | | |
|---|---|---|---|---|---|---|
| | No. 304 | No. 302 | No. 410 | No. 430 | No. 442 | No. 446 |
| Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville, Beth, Brackenridge | 23.00 | 22.50 | 17.50 | 17.50 | 21.00 | 25.50 |
| Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville, Beth, Brackenridge | 27.50 | 26.00 | 20.50 | 21.00 | 24.50 | 30.00 |
| Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet, Beth, Brackenridge | 27.50 | 26.00 | 20.50 | 21.00 | 24.50 | 30.00 |
| Plates, P'gh, Middletown, Canton, Brackenridge, Balt, Coatesville | 31.50 | 29.50 | 23.50 | 24.00 | 28.00 | 33.00 |
| Shapes, structural, P'gh, Chi, Brackenridge | 27.50 | 26.00 | 20.50 | 21.00 | 24.50 | 30.00 |
| Sheets, P'gh, Chi, Middletown, Canton, Balt, Brackenridge | 39.00 | 37.00 | 29.00 | 31.50 | 35.50 | 39.50 |
| Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown | 25.50 | 23.50 | 18.50 | 19.00 | 26.00 | 38.00 |
| Strip, c-r, P'gh, Cleve, Jersey City, Reading, Canton, Youngstown, Balt, W. Leechburg | 32.50 | 30.50 | 24.00 | 24.50 | 35.00 | 56.50 |
| Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne, Brackenridge | 27.50 | 26.00 | 20.50 | 21.00 | 24.50 | 30.00 |
| Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton, W. Leechburg | 32.46 | 30.30 | 23.80 | 24.34 | 34.82 | 56.26 |
| Rod, h-r, Syracuse | 27.05 | 25.97 | 20.02 | 20.56 | 24.34 | 28.75 |
| Tubing, seamless, P'gh, Chi, Canton, Brackenridge, Milwaukee | 72.09 | 72.09 | ..... | 68.49 | ..... | ..... |

## ELECTRODES

Cents per lb, f.o.b. plant, threaded electrodes with nipples, unboxed

| Diameter in in. | Length in in. | |
|---|---|---|
| **Graphite** | | |
| 17, 18, 20 | 60, 72 | 14.00¢ |
| 8 to 16 | 48, 60, 72 | 14.50¢ |
| 7 | 48, 60 | 15.75¢ |
| 6 | 48, 60 | 17.00¢ |
| 4, 5 | 40 | 17.50¢ |
| 3 | 40 | 18.50¢ |
| 2½ | 24, 30 | 19.00¢ |
| 2 | 24, 30 | 21.00¢ |
| **Carbon** | | |
| 40 | 100, 110 | 6.75¢ |
| 35 | 65, 110 | 6.75¢ |
| 30 | 65, 84, 110 | 6.75¢ |
| 24 | 72 to 104 | 6.75¢ |
| 17 to 20 | 84, 90 | 6.75¢ |
| 14 | 60, 72 | 7.25¢ |
| 10, 12 | 60 | 7.50¢ |
| 8 | 60 | 7.75¢ |

## TOOL STEEL

*f.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. •Also Canton, Ohio)*

| W | Cr | V | Mo | Co | Base per lb |
|---|---|---|---|---|---|
| 18 | 4 | 1 | — | — | .... 82¢ |
| 18 | 4 | 1 | — | 5 | ....$1.29 |
| 18 | 4 | 2 | — | — | .... 93¢ |
| 1.5 | 4 | 1.5 | 8 | — | .... 59¢ |
| 6 | 4 | 2 | 6 | — | .... 63¢ |

High-carbon-chromium• ..... 47¢
Oil hardening manganese• ..... 26¢
Special carbon• ..... 24¢
Extra carbon• ..... 20¢
Regular carbon• ..... 17¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi, 4¢ higher.

## ELECTRICAL SHEETS

*Base, all grades f.o.b. Pittsburgh*

| | Per lb |
|---|---|
| Armature | 4.70¢ to 5.05¢ |
| Electrical | 5.20¢ to 5.45¢ |
| Motor | 5.95¢ to 6.30¢ |
| Dynamo | 6.65¢ to 7.50¢ |
| Transformer 72 | 7.15¢ to 8.25¢ |
| Transformer 65 | 7.85¢ to 9.20¢ |
| Transformer 58 | 8.55¢ to 9.90¢ |
| Transformer 52 | 9.35¢ to 9.70¢ |

F.o.b. Chicago and Gary: armature through motor only. F.o.b. Granite City add to lower quotation 0.55¢ for armature through and including 72, and 0.45¢ for balance.

## RAILS, TRACK SUPPLIES

*(F.o.b. mill)*

Standard rails, 100 lb and heavier, No. 1 O.H., per 100 lb.....$2.70 to$2.75•
Joint bars, 100 lb..... 3.75
Light rails (from billets) per 100 lb. 3.05

•CF&I charges $3.05.

| | Base per lb |
|---|---|
| Cut spikes | 4.85¢ |
| Screw spikes | 6.90¢ |
| Tie plate, steel | 3.55¢ |
| Tie plates, Pittsburg, Calif. | 3.70¢ |
| Track bolts | 7.00¢ |
| Track bolts, heat treated, to railroads | 7.25¢ |

## C-R SPRING STEEL

*Base per pound f.o.b. Pittsburgh, Cleveland*

0.08 to 0.40 carbon..... 3.45¢
0.41 to 0.60 carbon..... 4.95¢
0.61 to 0.80 carbon..... 5.55¢
0.81 to 1.05 carbon..... 7.05¢
1.06 to 1.35 carbon..... 9.35¢
Worcester, add 0.20¢

## CLAD STEEL

*Base prices, cents per pound*

| Stainless-clad | Plate | Sheet |
|---|---|---|
| No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa. | •24.00 | •22.00 |
| Nickel-clad 10 pct, f.o.b. Coatesville, Pa. | 21.50 | .... |
| Inconel-clad 10 pct, f.o.b. Coatesville | 30.00 | .... |
| Monel-clad 10 pct, f.o.b. Coatesville | 24.00 | .... |
| Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh | .... | 9.00 |

• Includes annealing and pickling, or sandblasting.

## MERCHANT WIRE PRODUCTS

*To the dealer, f.o.b. Pittsburgh, Chicago, Birmingham*

| | Base Column | San Francisco |
|---|---|---|
| Standard & coated nails• | 91 | 112 |
| Galvanized nails• ..... | 91 | 112 |
| Woven wire fence† ..... | 97 | 120 |
| Fence posts, carloads†† .. | 104 | ... |
| Single loop bale ties.... | 94 | 118 |
| Galvanized barbed wire•• | 111 | 131 |
| Twisted barbless wire.. | 111 | ... |

• Also Duluth; Worcester, 6 columns higher. † 15½ gage and heavier. •• On 80-rod spools, in carloads. †† Duluth only.

| | Base per 100 lb | San Francisco |
|---|---|---|
| Annealed fence wire‡.... | $4.10 | $5.1145 |
| Annealed, galv. fencing‡ | 4.55 | 5.5645 |
| Cut nails, carloads‡‡.... | 6.15 | ... |

‡ Add 10¢ at Worcester. ‡‡ Wheeling only, Pittsburgh add 15¢ (less 20¢ to jobbers).

## HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

| Steel | Alde-cor | Corten | Double Strength No. 1 | Dyn-alloy | HI Steel | Mayari R | Otis-coloy | Yoloy | NAX High Tensile |
|---|---|---|---|---|---|---|---|---|---|
| Producer | Republic | Carnegie-Illinois, Republic | Republic | Alan Wood | Inland | Bethlehem | Jones & Laughlin | Youngstown Sheet & Tube | Great Lakes Steel |
| Plates | 4.55 | 4.45 | 4.55 | 4.55 | 4.45 | 4.55 | 4.45 | 4.55 | 4.55 |
| Sheets | | | | | | | | | |
| Hot-rolled | 4.30 | 4.20 | 4.30 | 4.50 | 4.20 | 4.30 | 4.20 | 4.30 | 4.30 |
| Cold-rolled | 5.30 | 5.20 | 5.30 | .... | 5.20 | 5.30 | 5.20 | 5.30 | 5.30 |
| Galvanized | | 5.90 | .... | .... | 5.90 | 6.00 | .... | .... | .... |
| Strip | | | | | | | | | |
| Hot-rolled | 4.10 | 4.20 | 4.30 | ... | 4.20 | 4.30 | 4.20 | 4.30 | 4.30 |
| Cold-rolled | .... | .... | 5.30 | .... | .. | 5.30 | 5.30 | 5.30 | 5.30† |
| Shapes | .... | 4.20 | . | .... | 4.20 | 4.30 | 4.20 | 4.30 | .... |
| Beams | .... | 4.20 | .... | .... | 4.20 | 4.30 | .... | .... | .... |
| Bars | | | | | | | | | |
| Hot-rolled | 4.45 | 4.35 | 4.45 | .... | 4.35 | 4.45 | 4.35 | 4.45 | 4.45 |
| Bar shapes | .... | 4.35 | .... | .... | 4.35 | 4.45 | 4.35 | 4.45 | .... |

† Pittsburgh, add 0.10¢ at Chicago and Gary.

## PIPE AND TUBING

*Base discounts, f.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only*
*Base price, $200.00 per net ton*

One producer allows 1 point less discount on steel buttweld.

### *Standard, threaded & coupled*

| Steel, buttweld | Black | Galv. |
|---|---|---|
| ⅛-in. | 48 | 30½ |
| ¼-in. | 51 | 34½ |
| 1-in. | 53½ | 37½ |
| 1¼-in. | 54 | 38 |
| 1½-in. | 54½ | 38½ |
| 2-in. | 55 | 39 |
| 2½ and 3-in. | 55½ | 39½ |
| **Wrought Iron, buttweld** | | |
| ⅛-in. | +11 | +35 |
| ¼-in. | + 1½ | +25 |
| 1 and 1¼-in. | 4 | +16½ |
| 1½-in. | 9½ | +13 |
| 2-in. | 10 | +12½ |
| **Steel, lapweld** | | |
| 2-in. | 44½ | 28 |
| 2½ and 3-in. | 48½ | 32 |
| 3½ to 6-in. | 50½ | 34 |
| **Steel, seamless** | | |
| 2-in. | 43½ | 27 |
| 2½ and 3-in. | 46½ | 30 |
| 3½ to 6-in. | 48½ | 32 |
| **Wrought Iron, lapweld** | | |
| 2-in. | 1½ | +20 |
| 2½ to 3½-in. | 4 | +16 |
| 4-in. | 8 | +10½ |
| 4½ to 8-in. | 6 | +12 |

### *Extra Strong, plain ends*

| Steel, buttweld | | |
|---|---|---|
| ⅛-in. | 46 | 30 |
| ¼-in. | 50 | 34 |
| 1-in. | 52 | 37 |
| 1¼-in. | 52½ | 37½ |
| 1½-in. | 53 | 38 |
| 2-in. | 53½ | 38½ |
| 2½ and 3-in. | 54 | 39 |
| **Wrought Iron, buttweld** | | |
| ⅛-in. | + 6½ | +29 |
| ¼-in. | + ½ | +23 |
| 1 and 1¼ in. | 4 | +16½ |
| 2-in. | 10 | +12½ |
| **Steel, lapweld** | | |
| 2-in. | 43½ | 28 |
| 2½ and 3-in. | 48½ | 33 |
| 3½ to 6-in. | 52 | 36½ |
| **Steel, seamless** | | |
| 2-in. | 42½ | 27 |
| 2½ and 3-in. | 46½ | 31 |
| 3½ and 6-in. | 50 | 34½ |
| **Wrought Iron, lapweld** | | |
| 2-in. | 4½ | +16½ |
| 2½ to 4-in. | 13 | + 6 |
| 4½ to 6-in. | 9 | +10½ |

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

## BOILER TUBES

*Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.*

| OD in In. | Gage BWG | Seamless Hot-Rolled | Seamless Cold-Drawn | Electric Weld Hot-Rolled | Electric Weld Cold-Drawn |
|---|---|---|---|---|---|
| 2 | 13 | $17.84 | $20.99 | $17.30 | $20.36 |
| 2½ | 12 | 23.99 | 28.21 | 23.27 | 27.36 |
| 3 | 12 | 26.68 | 31.40 | 25.88 | 30.46 |
| 3½ | 11 | 33.35 | 39.26 | 32.35 | 38.08 |
| 4 | 10 | 41.40 | 48.70 | 40.16 | 47.24 |

## CAST IRON WATER PIPE

*Per net ton*

6-in to 24-in., del'd Chicago ..... $98.70
6-in. to 24-in., del'd New York ..... 95.50
6-in. to 24-in., Birmingham ..... 85.50
6-in and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less ..... 112.30

Class 'A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

## BOLTS, NUTS, RIVETS, SET SCREWS

***Consumer Prices***

(*Bolts and nuts f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago*)

*Base discount less case lots*

### *Machine and Carriage Bolts*

*Percent Off List*

½ in. & smaller x 6 in. & shorter ... 45
9/16 & ⅝ in. x 6 in. & shorter ..... 46
¾ in. & larger x 6 in. & shorter ..... 43
All diam, longer than 6 in. ..... 41
Lag, all diam over 6 in. long ..... 44
Lag, all diam x 6 in. & shorter ..... 46
Plow bolts ..... 54

### *Nuts, Cold Punched or Hot Pressed*

(*Hexagon or Square*)

½ in. and smaller ..... 43
9/16 to 1 in. inclusive ..... 42
1⅛ to 1½ in. inclusive ..... 40
1⅝ in. and larger ..... 35

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

| *Semifin. Hexagon Nuts* | USS | SAE |
|---|---|---|
| 7/16 in. and smaller | .. | 46 |
| ½ in. and smaller | 44 | .. |
| ½ in. through 1 in. | .. | 44 |
| 9/16 in. through 1 in. | 43 | .. |
| 1⅛ in. through 1½ in. | 41 | 42 |
| 1⅝ in. and larger | 35 | .. |

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

### *Stove Bolts*

Packages, nuts separate ..... 65 and 10
In bulk ..... 75

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

### *Large Rivets* (½ *in. and larger*)

*Base per 100 lb*

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ..... $5.65
F.o.b. Lebanon, Pa. ..... 5.80

### *Small Rivets* (7/16 *in. and smaller*)

*Percent Off List*

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ..... 55

### *Cap and Set Screws*

(*In packages*) *Percent Off List*

Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright ..... 53
¾ to 1 in. x 6 in., SAE 1035, heat treated ..... 44
Set screws, oval points ..... 57
Milled studs ..... 29
Flat head cap screws, listed sizes ... 16
Fillister head cap, listed sizes ..... 37

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

## FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

| Effective $CaF_2$ Content: | *Base price per short ton* |
|---|---|
| 70% or more | $35.00 |
| 65% but less than 70% | 34.00 |
| 60% but less than 65% | 33.00 |
| Less than 60% | 32.00 |

## LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports*)

*Per Gross Ton*

Old range, bessemer ..... $6.60
Old range, nonbessemer ..... 6.45
Mesabi, bessemer ..... 6.35
Mesabi, nonbessemer ..... 6.20
High phosphorus ..... 6.20

Increases or decreases in freight rates, dock handling charges and taxes after Apr. 1, 1948, are to be added to above prices.

## METAL POWDER

*Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.*

Swedish sponge iron c.l.f. New York, ocean bags ..... 7.9¢ to 9.0¢
Domestic sponge iron, 98+% Fe ..... 9.5¢ to 16.0¢
Electrolytic iron, annealed, 99.5+% Fe ..... 19.5¢ to 39.0¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe. ..... 44.0¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe... 63.0¢ to 80.0¢
Carbonyl iron, minus 300 mesh, 98%, 99.8+% Fe.... 90.0¢ to $1.75
Aluminum ..... 23.0¢
Antimony ..... 46.0¢
Brass ..... 24.0¢ to 28.5¢
Copper, electrolytic ..... 30.625¢
Copper, reduced ..... 30.5¢
Cadmium ..... $2.40
Chromium, electrolytic, 99% min. ..... $3.50
Lead ..... 24.0¢
Manganese ..... 50.0¢
Molybdenum, 99% ..... $2.65
Nickel, unannealed ..... 51.5¢
Nickel, spherical, minus 30 mesh ..... 53.0¢
Silicon ..... 29.0¢
Solder powder ..... 8.5¢ plus metal cost
Stainless steel, 302 ..... 75.0¢
Tin ..... $1.01⅛
Tungsten, 98%, 99% ..... $2.90

## COKE

Furnace, beehive (f.o.b. oven) Net Ton
Connellsville, Pa. ... $12.00 to $13.00
Foundry, beehive (f.o.b. oven)
Connellsville, Pa. ... 13.50 to 14.50
Foundry, Byproduct
Chicago, del'd ..... $18.60
Chicago, f.o.b. ..... 17.50
Detroit, f.o.b. ..... 18.50
New England, del'd ..... 21.75
Seaboard, N. J., f.o.b. ..... 20.50
Philadelphia, f.o.b. ..... 19.50
Swedeland, Pa., f.o.b. ..... 19.50
Ashland, Ohio, f.o.b. ..... 18.25
Painesville, Ohio, f.o.b. ..... 19.45
Erie, del'd ..... 19.90
Cleveland, del'd ..... 17.90
Cincinnati, del'd ..... 18.59
St. Louis, del'd ..... 18.07
Birminham, del'd ..... 16.71

## REFRACTORIES

(*F.o.b. Works*)

### *Fire Clay Brick*

*Carloads, Per 1000*

No. 1 Ohio ..... $67.00
First quality, Pa., Md., Ky., Mo., Ohio ..... 73.00
First quality, New Jersey ..... 78.00
Sec. quality, Pa., Md., Ky., Mo., Ohio 67.00
Sec. quality, New Jersey ..... 70.00
No. 2 Ohio ..... 59.00
Ground fire clay, net ton, bulk .... 10.50

### *Silica Brick*

Pennsylvania and Birmingham .... $73.00
Chicago District and Alabama .... 82.00
Silica cement, net ton (Eastern) .. 12.50
East Chicago ..... 13.50

### *Chrome Brick*

*Per Net Ton*

Standard chemically bonded, Balt., Plymouth Meeting, Chester ..... $64.00

### *Magnesite Brick*

Standard, Balt. and Chester ..... $86.00
Chemically bonded, Baltimore ..... 75.00

### *Grain Magnesite*

*std. ⅜-in. grains*

Domestic, f.o.b. Balt. and Chester in bulk, fines removed ..... $51.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines ..... 27.00
in sacks with fines ..... 31.50

### *Dead Burned Dolomite*

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk. Midwest, add 10¢: Missouri Valley, add 20¢ $11.05

## WAREHOUSE PRICES

*Base prices, delivered metropolitan areas, per 100 lb.*

| CITIES | SHEETS | | | STRIP | | PLATES | SHAPES | BARS | | ALLOY BARS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hot-Rolled | Cold-Rolled (15 gage) | Galvanized (10 gage) | Hot-Rolled | Cold-Rolled | | Standard Structural | Hot-Rolled | Cold-Finished | Hot-Rolled, A 4615 As-rolled | Hot-Rolled A 4140-50 Ann. | Cold-Drawn, A 4615 As-rolled | Cold-Drawn, A 4140-50 Ann. |
| Philadelphia | $4.47 | $5.66 | $5.92 | $4.82 | $5.90 | $4.82 | $4.54 | $4.86 | $5.73 | $8.50 | $7.15 | $10.18 | $10.38 |
| New York | 4.84 | 6.01[1] | 6.16 | 5.06 | 6.36 | 5.11 | 4.80 | 5.06 | 5.78 | 8.58 | 8.73 | 10.22 | 10.43 |
| Boston | 4.83 | 5.69 | 6.23[12] | 5.61 | 6.87 | 5.18 | 4.91 | 5.04 | 5.88 | 8.99 | 9.14 | 10.43 | 10.58 |
| Baltimore | 4.27 | .... | 5.62 | 4.79 | .... | 4.72 | 4.69 | 4.84 | 5.68 | .... | .... | .... | .... |
| Norfolk | 4.90 | .... | .... | 5.30 | .... | 5.15 | 5.15 | 5.20 | 6.00 | .... | .... | .... | .... |
| Chicago | 4.20 | 5.00 | 5.88 | 4.35 | 5.35-6.65 | 4.55 | 4.35 | 4.35 | 5.00-5.10 | 8.05 | 8.20 | 9.30 | 9.50 |
| Milwaukee | 4.57 | 5.37 | 5.95 | 4.72 | 5.83 | 4.92 | 4.72 | 4.72 | 5.48-5.58 | 8.53 | 8.68 | 9.78 | 9.98 |
| Cleveland | 4.25 | 5.10[1] | 5.82 | 5.05 | 5.95 | 4.60† | 4.70 | 4.40 | 5.10 | 8.61 | 8.78 | 9.50 | 9.85 |
| Buffalo | 4.25 | 5.10 | 6.06 | 5.26 | 5.97 | 5.01 | 4.40 | 4.40‡ | 5.10 | 8.20 | 8.35 | 9.50 | 9.65 |
| Detroit | 4.41 | 5.26 | 6.07 | 4.77 | 5.67 | 4.92† | 4 82 | 4.56-4.82 | 5.26 | 8.82 | 8.97 | 10.09 | 10.24 |
| Cincinnati | 4.56 | 5.22 | 5.57 | 4.77 | .... | 4.98 | 4.82 | 4.78 | 5.63 | 8.85 | 9.00 | 10.16 | 10.31 |
| St. Louis | 4.59 | 5.39 | 6.17 | 4.69 | 6.02 | 4.89 | 4.74 | 4.76 | 5.67 | 8.92 | 9.07 | 10.22 | 10.37 |
| Pittsburgh | 4.25 | 5.10[1] | 5.65 | 4.35 | .... | 4.60 | 4.40 | 4.40 | 5.10 | 8.20 | 8.35 | 9.50 | 9.65 |
| St. Paul | 4.68 | 5.46 | 6.0 | 4.78 | .... | 5.01 | 4.81 | 4.81 | 5.94 | .... | .... | .... | .... |
| Omaha | 5.262 | .... | 6.712 | 5.362 | .... | 5.612 | 5.412 | 5.412 | 6.112 | .... | .... | .... | .... |
| Indianapolis | 4.55 | 5.38 | 5.93 | 4.65 | 5.95 | 4.90 | 4.70 | 4.70 | 5.57 | .... | .... | .... | .... |
| Birmingham | 4.45[11] | .... | 5.80 | 4.45[11] | .... | 4.65[11] | 4.40[11] | 4.40[11] | 6.09 | .... | .... | .... | .... |
| Memphis | 4.88[11] | 5.94[1] | 5.08[11] | .... | 5.23[11] | 5.03[11] | 5.03[11] | 5.94 | .... | .... | .... | .... | .... |
| New Orleans | *5.05[11] | 6.39[1] | .... | 5.25[11] | .... | 5.40[11] | *5.10[11] | *5.20[11] | 6.39[6] | .... | .... | .... | .... |
| Houston | 5.55 | .... | 7.21 | 5.65 | .... | 5.90 | 5.70 | 5.70 | 7.00 | 9.40 | 9.25 | 10.40 | 10.55 |
| Los Angeles | 3.70 | 7.25[1] | 7.30 | 6.00 | 8.60[5] | 5.35 | 5.15 | 5.45 | 7.25[14] | 9.55[15] | 9.40[15] | 10.95[15] | 11.15[15] |
| San Francisco | 5.35[4] | 6.55 | 6.95 | 5.70[5] | 8.60 | 5.30 | 5.10 | 5.00 | 7.40 | 9.55[15] | 9.45[15] | 11.05[15] | 11.20[15] |
| Seattle | 5.45[4] | 7.25[3] | 7.10 | 6.15[4] | .... | 5.70 | 5.40[4] | 5.65[4] | 7.45[14] | .... | 9.70[15] | .... | 11.30[15] |
| Portland | 5.70 | 7.25[2] | 7.10 | 5.85[4] | .... | 5.70[4] | 5.40[4] | 5.65[4] | 7.45[14] | .... | 8.95[16] | .... | 11.30[15] |
| Salt Lake City | 6.40 | .... | 7.85 | 6.70 | .... | 6.20 | 6.35 | 6.55 | 7.55 | .... | .... | .... | .... |

## BASE QUANTITIES

*Standard unless otherwise keyed on prices.*

**HOT-ROLLED:** Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

**COLD-ROLLED:** Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

**ALLOY BARS:** 1000 to 1999 lb.

**GALVANIZED SHEETS:** 450 to 1499 lb.

**EXCEPTIONS:** (1) 400 to 1499 lb (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 8999 lb; (12) 450 to 8749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb.

* Add 46¢ for sizes not rolled in Birmingham
† Up to ¾ in. thick and 90 in. wide
‡ Add 41¢ for sizes not rolled at Buffalo.

## PIG IRON PRICES

*Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.*

BASING POINT* PRICES

| Basing Point | Basic | No. 2 Foundry | Malleable | Bessemer | Low Phos. |
|---|---|---|---|---|---|
| Bethlehem | 40.00 | 40.50 | 41.00 | 41.50 | ..... |
| Birmingham | 38.88 | 39.38 | ..... | ..... | ..... |
| Buffalo | 40.00-42.38* | 40.00-42.88* | 40.50-43.38* | ..... | ..... |
| Chicago | 38.50 | 39.00 | 39.50 | 40.00 | ..... |
| Cleveland | 38.50-39.75* | 39.00-40.25* | 39.50-40.75* | ..... | ..... |
| Duluth | 39.00 | 39.50 | 40.00 | 40.50 | ..... |
| Erie | 38.50 | 39.00 | 39.50 | 40.00 | ..... |
| Everett | | 45.00 | 45.50 | ..... | ..... |
| Granite City | 45.25 | 45.75 | 46.25 | ..... | ..... |
| Neville Island | 39.00 | 39.50 | 39.50 | 40.00 | ..... |
| Provo | 39.00 | 39.50 | ..... | ..... | ..... |
| Sharpsville | 39.00 | 39.50 | 39.50 | 40.00 | ..... |
| Steelton | 40.00 | ..... | ..... | ..... | 46.00 |
| Struthers, Ohio | 39.50 | ..... | ..... | ..... | ..... |
| Swedeland | 45.00 | 45.50 | 46.00 | 46.50 | ..... |
| Toledo | 38.50 | 39.00 | 39.50 | 40.00 | ..... |
| Troy, N. Y. | ..... | ..... | ..... | ..... | 46.00 |
| Youngstown | 39.00 | 39.50 | 39.50 | 40.00 | ..... |

DELIVERED PRICES† (BASE GRADES)

| Consuming Point | Basing Point | Freight Rate | Basic | No. 2 Foundry | Malleable | Bessemer | Low Phos. |
|---|---|---|---|---|---|---|---|
| Boston | Everett | $0.50 Arb. | ..... | 45.50 | 46.00 | ..... | ..... |
| Boston | Steelton | 6.27 | 46.27 | ..... | ..... | ..... | 52.27 |
| Brooklyn | Bethlehem | 3.90 | 43.90 | ..... | ..... | ..... | ..... |
| Cincinnati | Birmingham | 6.09 | 44.97 | 45.47 | ..... | ..... | ..... |
| Jersey City | Bethlehem | 2.39 | 42.39 | 42.89 | 43.39 | 43.89 | ..... |
| Los Angeles | Provo | 6.93 | 45.93 | 44.43 | ..... | ..... | ..... |
| Mansfield | Cleveland-Toledo | 3.03 | 41.53-42.78* | 42.03-43.28* | 42.53-43.78* | ..... | ..... |
| Philadelphia | Bethlehem | 2.17 | 42.17 | 42.67 | 43.17 | 43.67 | ..... |
| Philadelphia | Swedeland | 1.31 | 46.31 | 46.81 | 47.31 | 47.61 | ..... |
| Philadelphia | Steelton | 2.81 | 42.81 | ..... | ..... | ..... | 48.81 |
| San Francisco | Provo | 6.93 | 45.93 | 46.43 | ..... | ..... | ..... |
| Seattle | Provo | 6.93 | 45.93 | 46.43 | ..... | ..... | ..... |
| St. Louis | Granite City | 0.75 Arb. | 46.00 | 46.50 | 47.00 | ..... | ..... |

* Republic Steel Corp. price. Basis: pig iron at Cleveland and Buffalo set by average price of No. 1 hvy. melt. steel scrap at Cleveland or Buffalo respectively as shown in last week's issue of THE IRON AGE. Price is effective until next Sunday midnight.

**Basing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.**

**Silvery iron (blast furnace) silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$49.50; f.o.b. Buffalo—$50.75. Add $1.25 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.**

Charcoal pig iron base price for low phosphorus $58.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago, $65.55. High phosphorus charcoal pig iron is not being produced.

### *Ferromanganese*

78-82% Mn, Maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk) ..... $145
Less ton lots (packed) ..... 189.00
Delivered Pittsburgh ..... 151.00

$1.80 for each 1% above 82% Mn; penalty, $1.80 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

| | Eastern | Central | Western |
|---|---|---|---|
| Carload, bulk ... | 8.70 | 8.95 | 9.50 |
| Ton lots ..... | 10.30 | 10.90 | 12.80 |
| Less ton lots ... | 11.20 | 11.80 | 13.70 |

### *Spiegeleisen*

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

| | 16-19% Mn 3% max. Si | 19-21% Mn 3% max. Si |
|---|---|---|
| Carloads ..... | $51.00 | $52.00 |
| F.o.b. Pittsburg.h. | 50.00 | 51.00 |

### *Manganese Metal*

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

| | |
|---|---|
| Carload, bulk ..... | 32 |
| L.c.l. lots ..... | 34 |

### *Electrolytic Manganese*

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

| | |
|---|---|
| Carloads ..... | 32 |
| Ton lots ..... | 34 |
| Less ton lots ..... | 36 |

### *Low-Carbon Ferromanganese*

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

| | Carloads | Ton | Less |
|---|---|---|---|
| 0.07% max. C. 0.06% P, 90% Mn. ..... | 23.00 | 24.85 | 26.05 |
| 0.10% max. C. ..... | 22.50 | 24.35 | 25.55 |
| 0.15% max. C. ..... | 22.00 | 23.85 | 25.05 |
| 0.30% max. C. ..... | 21.50 | 23.35 | 24.55 |
| 0.50% max. C. ..... | 21.00 | 22.85 | 24.05 |
| 0.75% max. C., 7.00% max. Si. .... | 18.00 | 19.85 | 21.05 |

### *Silicomanganese*

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

| | |
|---|---|
| Carload bulk ..... | 7.80 |
| Ton lots ..... | 9.45 |
| Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet | 8.75 |
| Ton lots ..... | 10.35 |
| Less ton lots ..... | 11.25 |

### *Silvery Iron (electric furnace)*

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, openhearth $78.00, foundry, $79.00; $78.75 f.o.b. Niagara Falls; $77.50 f.o.b. Jackson, Ohio. Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for each 0.50 pct Mn over 1 pct.

### *Silicon Metal*

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

| | Eastern | Central | Western |
|---|---|---|---|
| 96% Si, 2% Fe.. | 16.90 | 17.50 | 18.10 |
| 97% Si, 1% Fe.. | 17.30 | 17.90 | 18.50 |

### *Silicon Briquets*

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si, 1 lb Si briquets.

| | Eastern | Central | Western |
|---|---|---|---|
| Carload, bulk ... | 5.25 | 5.50 | 5.70 |
| Ton lots ..... | 6.85 | 7.45 | 7.75 |
| Less ton lots ... | 7.75 | 8.35 | 8.65 |

### *Electric Ferrosilicon*

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

| | Eastern | Central | Western |
|---|---|---|---|
| 25% Si ..... | 15.50 | .... | .... |
| 50% Si ..... | 9.30 | 9.80 | 10.00 |
| 75% Si ..... | 11.80 | 12.10 | 12.85 |
| 85% Si ..... | 13.30 | 13.60 | 14.35 |
| 90% Si ..... | 15.00 | 15.30 | 16.00 |

### *Ferrochrome* (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

| | Eastern | Central | Western |
|---|---|---|---|
| 0.06% C ..... | 26.50 | 26.90 | 27.00 |
| 0.10% C ..... | 26.00 | 26.40 | 26.50 |
| 0.15% C ..... | 25.50 | 25.90 | 26.00 |
| 0.20% C ..... | 25.25 | 25.65 | 25.75 |
| 0.50% C ..... | 25.00 | 25.40 | 25.50 |
| 1.00% C ..... | 24.50 | 24.90 | 24.75 |
| 2.00% C ..... | 24.25 | 24.65 | 24.75 |
| 65-69% Cr, 4-9% C ..... | 18.60 | 19.00 | 19.15 |
| 62-66% Cr. 4-6% C. 6-9% Si. ..... | 19.45 | 19.85 | 20.00 |

Briquets — Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

| | Eastern | Central | Western |
|---|---|---|---|
| Carload, bulk ... | 12.50 | 12.75 | 12.85 |
| Ton lots ..... | 14.00 | 14.90 | 15.50 |
| Less ton lots.... | 14.90 | 15.80 | 16.40 |

### *High-Nitrogen Ferrochrome*

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

### *S. M. Ferrochrome*

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

| | Eastern | Central | Western |
|---|---|---|---|
| Carload ..... | 19.70 | 20.10 | 20.25 |
| Ton lots ..... | 21.85 | 23.15 | 23.95 |
| Less ton lots ... | 23.35 | 24.65 | 25.45 |

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% mn, 1.25% max. C.

| | Eastern | Central | Western |
|---|---|---|---|
| Carload ..... | 25.00 | 25.40 | 25.50 |
| Ton lots ..... | 27.30 | 27.95 | 29.15 |
| Less ton lots ... | 29.10 | 29.75 | 30.95 |

### *Chromium Metal*

Contract prices, cents per lb, chromium contained carload packed, f.o.b. shipping point freight allowed, 97% min. Cr. 1% max. Fe.

| | Eastern | Central | Western |
|---|---|---|---|
| 0.20% max. C. .. | 97.00 | 98.50 | 99.75 |
| 0.50% max. C. .. | 93.00 | 94.50 | 95.75 |
| 9.00% min. C. .. | 91.50 | 93.00 | 94.25 |

### *Calcium—Silicon*

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe r 28-32% Ca, 60-65% Si, 6.00% max. Fe.

| | Eastern | Central | Western |
|---|---|---|---|
| Carloads ..... | 16.25 | 16.75 | 18.80 |
| Ton lots ..... | 19.35 | 20.10 | 22.25 |
| Less ton lots .... | 20.85 | 21.60 | 23.75 |

### *Calcium—Manganese—Silicon*

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

| | Eastern | Central | Western |
|---|---|---|---|
| Carloads ..... | 17.50 | 18.00 | 20.05 |
| Ton lots ..... | 19.80 | 20.65 | 22.40 |
| Less ton lots ... | 20.80 | 21.65 | 23.40 |

### *Calcium Metal*

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

| | Cast Turnings | Distilled |
|---|---|---|
| Ton lots .....| $1.85 | $2.70 | $3.40 |
| Less ton lots .... | 2.20 | 3.05 | 4.20 |

### *CMSZ*

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-500% C.

| | Eastern | Central | Western |
|---|---|---|---|
| Ton lots ..... | 18.00 | 19.10 | 21.05 |
| Less ton lots ... | 19.25 | 20.35 | 22.30 |

### *SMZ*

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn. 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

| | Eastern | Central | Western |
|---|---|---|---|
| Ton lots ..... | 15.75 | 16.85 | 18.80 |
| Less ton lots ... | 17.00 | 18.10 | 20.05 |

### *Other Ferroalloys*

Ferrotungsten, standard, lump or ¼ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained W, 5 ton lots, freight allowed... $2.35

Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.

| | |
|---|---|
| Openhearth ..... | $2.90 |
| Crucible ..... | 3.00 |
| High speed steel (Primos) ... | 3.10 |

Vanadium pentoxide, 88-92% $V_2O_5$ contract basis, per pound contained $V_2O_5$ ..... $1.30

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb

| | |
|---|---|
| Ton lots ..... | $2.50 |
| Less ton lots ..... | $2.55 |

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo. ..... 86¢

Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo. ..... 86¢

Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo..... 86¢

Molybdenum oxide in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo..... 86¢

Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti $1.23

Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti

| | |
|---|---|
| Ton lots ..... | $1.35 |
| Less ton lots ..... | $1.40 |

High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton....$152.50

Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Sigio, Mt. Pleasant, Tenn., $3 unitage, per gross ton ..... $65.00
Less ton lots ..... $1.25

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

| | |
|---|---|
| Carload lots ..... | 18.40¢ |

Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy

| | |
|---|---|
| Carload, bulk ..... | 6.00¢ |

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.

| | |
|---|---|
| Carload ..... | 7.30¢ |
| Ton lots ..... | 7.70¢ |

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound

| | |
|---|---|
| Car lots ..... | 9.50¢ |
| Ton lots ..... | 10.25¢ |

### *Boron Agents*

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

| Eastern | Central | Western |
|---|---|---|
| $1.20 | $1.23 | $1.21 |

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

| | | | |
|---|---|---|---|
| Ton lots ... | $1.89 | $1.903 | $1.935 |
| Less ton lots | 2.01 | 2.023 | 2.044 |

Nickel—Boron 15-18% B, 1.00% max. Al 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

| | | | |
|---|---|---|---|
| Less ton lots.. | $1.80 | $1.8125 | $1.8445 |

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.

| | |
|---|---|
| Carload lots ..... | 39.00¢ |

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

| | |
|---|---|
| No. 1 ..... | 53¢ |
| No. 6 ..... | 53¢ |
| No. 79 ..... | 45¢ |

Bortram, f.o.b. Niagara Falls

| | |
|---|---|
| Ton lots, per pound ..... | 45¢ |
| Less ton lots, per pound ..... | 50¢ |

Carbortam, f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15-17%, B 0.90-1.15%, Si 2.5-3.0%, Al 1.0-2.0%.

| | |
|---|---|
| Ton lots, per pound ..... | 8.0¢ |

Borosil, f.o.b. Philo, Ohio, freight allowed, B 3%-4%, Si 40%-45%, per lb contained B.....$6.25

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For fast, straight sawing of thick, tough plates, slabs and shapes, Lukens Steel Company uses Espen-Lucas Cold Sawing Machines. Hydraulic feeds, extra-rigid construction and speeds that can drive the largest saws through the heaviest cuts are Espen-Lucas qualities that are making it possible to speed up shipbuilding, gun, shell and other munitions jobs. Espen-Lucas Machine Works, Front Street and Girard Avenue, Philadelphia 23, Pa.

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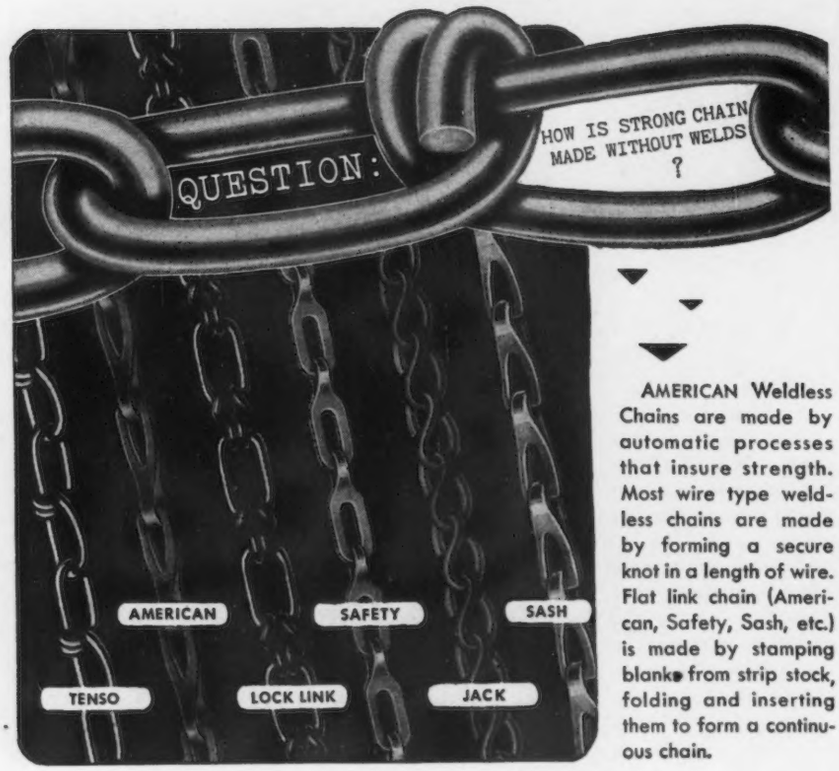


AMERICAN Weldless Chains are made by automatic processes that insure strength. Most wire type weldless chains are made by forming a secure knot in a length of wire. Flat link chain (American, Safety, Sash, etc.) is made by stamping blanks from strip stock, folding and inserting them to form a continuous chain.

# AMERICAN WELDED AND WELDLESS CHAIN

Shown here are some of the more popular AMERICAN weldless chains. AMERICAN CHAIN also offers a complete line of electric welded and fire welded chain—chain fittings and assemblies—repair links—cotter pins—hooks. Whatever your chain needs, get in touch with your AMERICAN CHAIN distributor.

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AMERICAN CHAIN DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

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## PERSONALS

*(Continued from p. 112)*

• **Edward G. Grigg** has been named manager of General Electric Co.'s lamp works now under construction at Circleville, Ohio. Mr. Grigg joined GE in 1936, and until his new appointment he was lamp department operation engineer at Nela Park.

• **Matthew L. Snodgrass,** formerly manager of the furnace division of the Gas Machinery Co., Cleveland, has been elected vice-president. He will continue to direct the activities of the furnace division.

• **T. A. St. Clair** has been appointed development engineer for the Weatherhead Co. LP-Gas Div., Cleveland. He was previously associated with the Phillips Petroleum Co. **M. C. Peterson** has been made sales manager of the Industrial Hose Div. of Weatherhead. Prior to joining the Company Mr. Peterson was for 14 years associated with the Flex-O-Tube Co. as general sales manager and later as vice-president in charge of sales.

• **C. W. Coslow,** vice-president in charge of manufacturing of the Los Angeles plant, and **M. M. Mautner,** vice-president and secretary, have been elected directors of the Plomb Tool Co., Los Angeles.

• **W. Earle Bartholomew,** former methods engineer of the Sterling Engine Co., has been named administrative assistant to the manager of the Buffalo assembly plant of the Ford Motor Co.

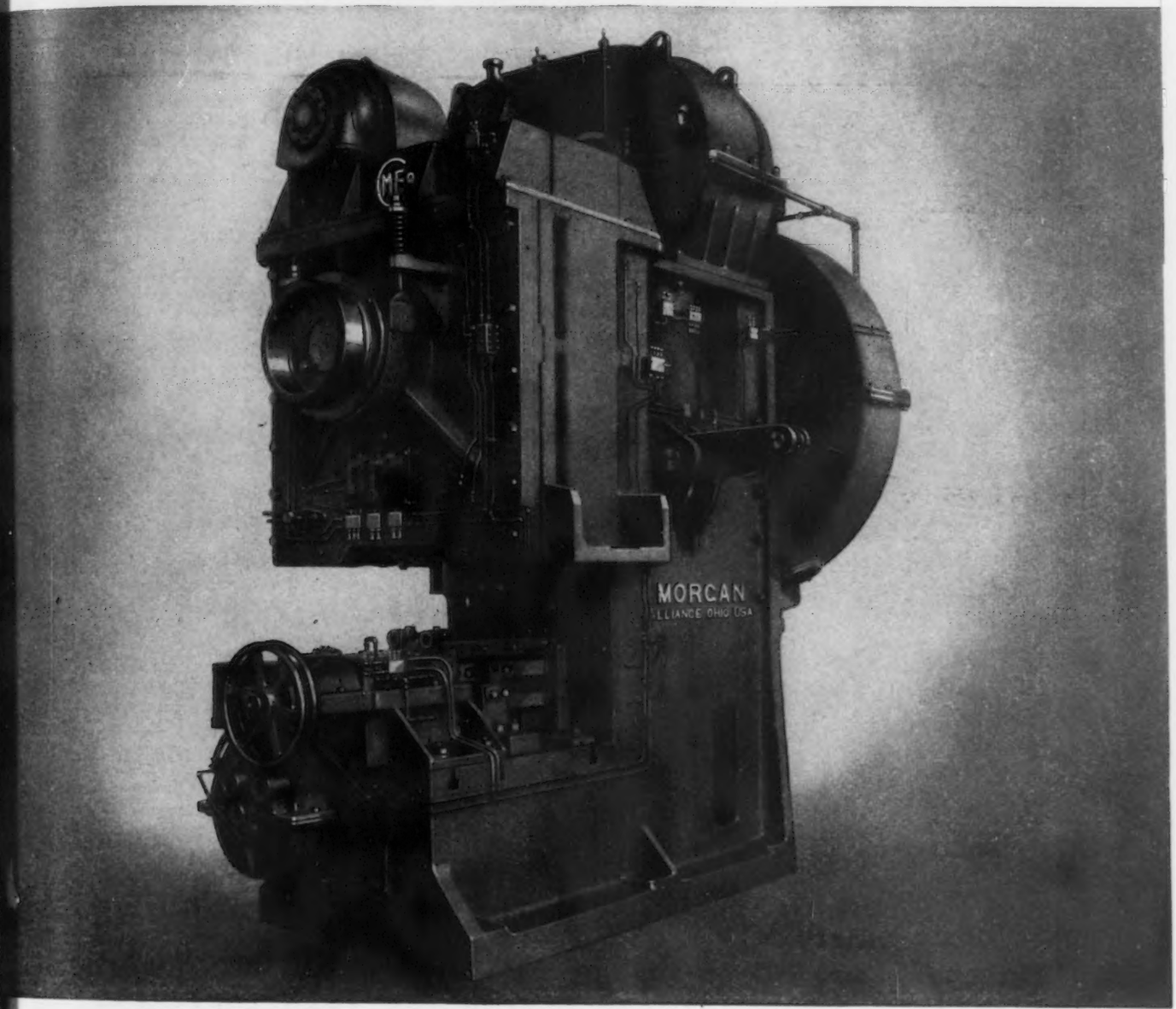
• **Marion R. Dilling** has been appointed assistant IBM manager of customer engineering, International Business Machine Corp., New York. He was previously manager of all IBM sales and services in Helena, Mont.

• **Robert W. Murphy** has been appointed general counsel for Borg-Warner Corp., Chicago, succeeding G. A. Shallberg in this position. Mr. Shallberg will continue as executive vice-president of the corporation. Mr. Murphy joined the Borg-Warner legal staff in 1942 and since 1943 has been assistant general counsel for the company.

• **D. W. R. Morgan** and **John K. Hodnette** have been elected vice-presidents, and **E. V. Huggins** has been made secretary of the Westinghouse Electric Corp., Pittsburgh. Mr. Morgan will continue to direct

BUILT BY MORGAN Engineering

# MORGAN 600-TON MOTOR DRIVEN STRUCTURAL SHEAR




**Illustrated is a Morgan 600-Ton Motor Driven Structural Shear for shearing products from a Morgan 29″ and 23″ Rail and Structural Mill. It will shear up to 4½″ x 4½″ Billets and 4½″ Rounds; Eye Beams and Channels up to 15″; a full line of Angles with equal and unequal legs up to 8″ x 8″; also Fish and Tie Plates.**

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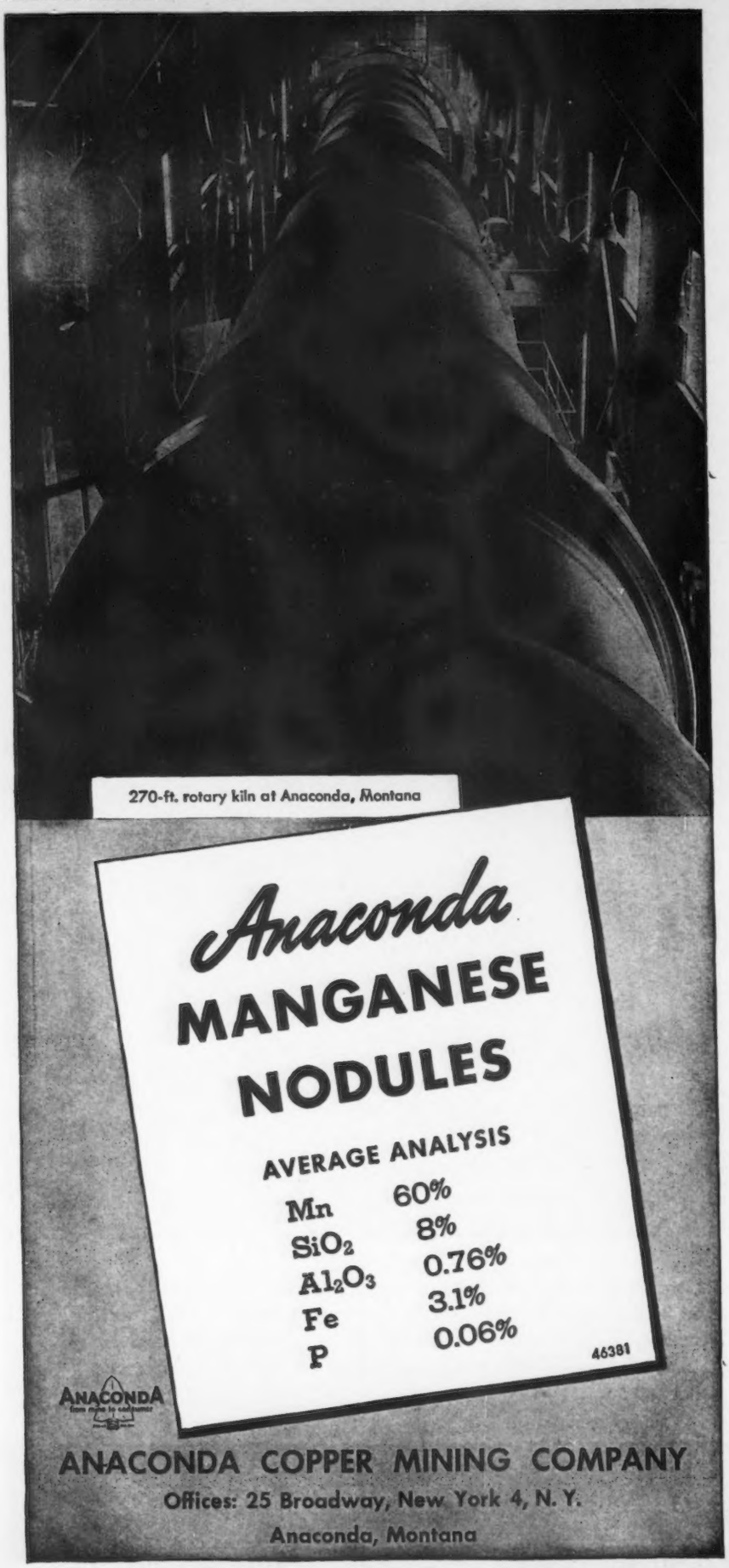
**DESIGNERS • MANUFACTURERS • CONTRACTORS** • BLOOMING MILLS • PLATE MILLS • STRUCTURAL MILLS • ELECTRIC TRAVELING CRANES • CHARGING MACHINES • INGOT STRIPPING MACHINES • SOAKING PIT CRANES • ELECTRIC WELDED FABRICATION • LADLE CRANES • STEAM HAMMERS • STEAM HYDRAULIC FORGING PRESSES • SPECIAL MACHINERY FOR STEEL MILLS






operations at the Westinghouse South Philadelphia works, which includes the steam division and the aviation gas turbine division there, as well as the stoker division at Attica, N. Y. He has been general manager of the three divisions for 2 years. Mr. Hodnette will retain his post as manager of the company's transformer division, a responsibility he assumed in 1946. Mr. Huggins, the new secretary, was in charge of the company's legal activities in New York before his newest appointment, which activities he will continue to head.

• **Foster W. Lamb** has been appointed general sales manager of Templeton, Kenly & Co., Chicago, succeeding **E. T. Scott,** who has resigned. Mr. Lamb was formerly assistant to the general manager of sales of the Colorado Fuel & Iron Corp.

• **James M. Underwood,** president of Vulcan Mold & Iron Co., has been elected a director of Latrobe Electric Steel Co., Latrobe, Pa. Mr. Underwood had been connected with Latrobe Electric Steel before leaving to accept the presidency of Vulcan.

• **A. W. Ross,** former body engineer for Plymouth Motor Corp., Detroit, has been named assistant chief engineer.

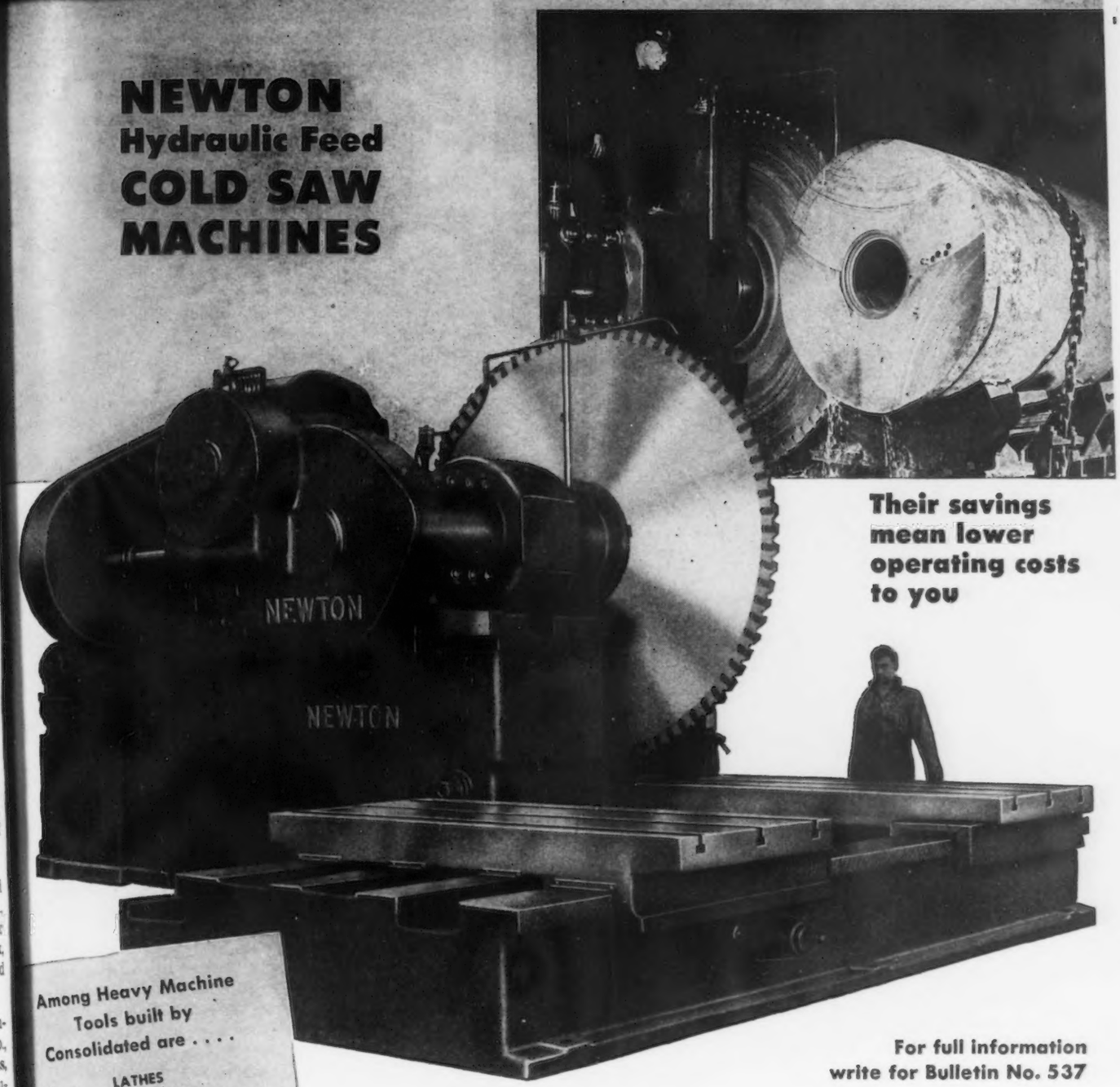
• **H. S. Hagan** has been appointed acting manager of the Butler, Pa., plant of Pullman-Standard Car Mfg. Co., replacing **R. M. Fox,** manager, who has been granted a leave of absence.

• **W. R. Persons,** general sales manager of the Lincoln Electric Co., Cleveland, and **K. F. Steingass,** superintendent of electrode manufacture, have been elected to the board of directors of the company.

• **R. F. Hartner** has been elected treasurer and assistant secretary and **T. A. Straub, Jr.,** assistant to the president of Fort Pitt Bridge Works, Pittsburgh.

• **Howard J. Smith** has been appointed assistant manager of the resale chemicals section in Wilmington of the Grasselli chemicals department, E. I. du Pont de Nemours & Co. and **Henry F. Koll** has been made manager of the district office at Charlotte, N. C. Mr. Smith was associated with the Grasselli department for a period of years as branch manager and assistant district manager at Phila-

# NEWTON Hydraulic Feed COLD SAW MACHINES

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**NEWTON Hydraulic Cold Saw Machines are built in a range of designs of proved adaptability to handling all types of work in either ferrous or non-ferrous metals. Built in sizes to accommodate blades from 32″ to 120″ diameter.**

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## PERSONALS

delphia before going to Charlotte as district manager in 1937. Mr. Koll joined the Grasselli department at the Cleveland laboratory in 1932, and from 1945 to 1948 he worked out of the Philadelphia sales office.

• **C. Porter Packard** has been appointed district manager of the Boston office territory of the Crocker-Wheeler Electric Mfg. Co., division of Joshua Hendy Corp. Mr. Packard came to Crocker-Wheeler from the general industry section of the Industrial Div. of Westinghouse Electric Corp.

• **G. L. Thomas** has been elected manager of the U. S. Steel and Carnegie Pension Fund, succeeding **H. A. Schultz,** who has retired after 41 years of service with U. S. Steel Corp., Pittsburgh. Mr. Thomas joined the staff of the pension fund in 1944 as assistant treasurer.

• **Fred L. Haven,** a member of the manager's staff, American Steel & Wire Co., Cleveland, has retired after 46 years of service.

• **John R. Quinn** has been named assistant product manager of the extrusion and tubing division, Reynolds Metals Co., Louisville. Before coming with Reynolds, Mr. Quinn spent 16 years with the W. S. Tyler Co.

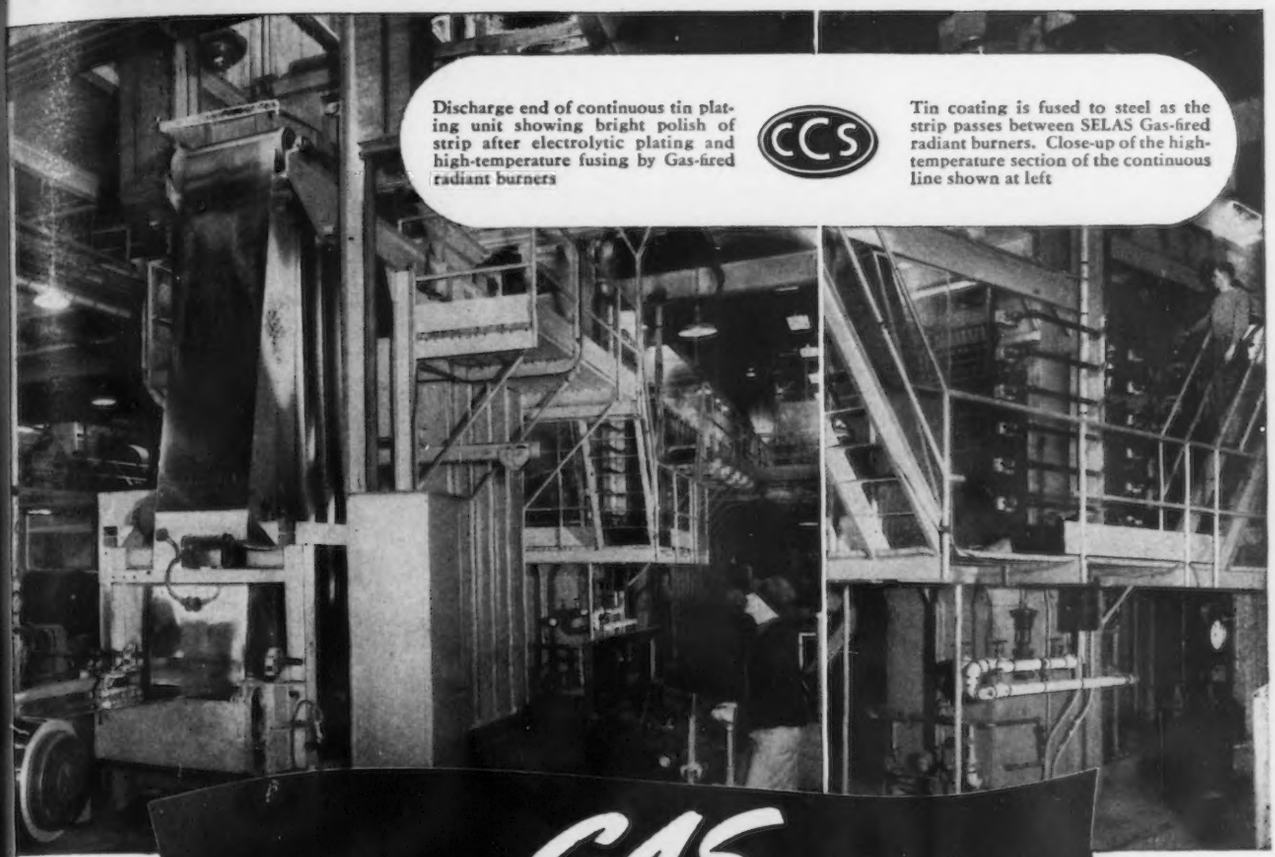
• **Robert N. Yates,** sales manager of Erie Foundry Co., Erie, Pa., has been named advertising manager.

• **Malcolm W. Welty** has been appointed staff assistant of the industrial relations department of Ford Motor Co., Dearborn, Mich. For the past 5 years, Mr. Welty has been assistant manager of Automotive & Aviation Parts Manufacturers, Inc.

• **R. W. Helmig** has been elected vice-president and director of the Electric Products Co., Cleveland. Mr. Helmig joined the company in 1944.

• **C. F. Larsen** has been appointed manager of general service and **C. A. Slifer,** assistant, of Mack Trucks, Inc. Both men will make their headquarters at the company's Plainfield, N. J. plant. **George McCall** has been appointed manager of service engineering, with offices at Mack's Long Island City, N. Y. plant.

• **Arthur B. Goetze,** personnel director of the Western Electric Co., New York, has been appointed to the post of acting works manager of the company's Tonawanda, N. Y.



Discharge end of continuous tin plating unit showing bright polish of strip after electrolytic plating and high-temperature fusing by Gas-fired radiant burners

Tin coating is fused to steel as the strip passes between SELAS Gas-fired radiant burners. Close-up of the high-temperature section of the continuous line shown at left

# RADIANT GAS BURNERS create high-temperature tin-coat fusing zone

**BRIGHT FINISHING** was the problem—and engineers of Crown Cork and Seal Company, Inc., Baltimore, adopted a high-temperature method for fusing tin to low-carbon strip, with resultant high-polish surface, in a continuous production mill.

Then, to obtain the high temperatures necessary for heat-processing, these engineers selected GAS and modern Gas Equipment. By directing the heat of radiant GAS burners over a concentrated area of the freshly-plated strip it was readily possible to coordinate the fusing action with the plating process to accomplish continuous high-speed production of bright finished strip.

This typical installation demonstrates the flexibility of GAS and the applicability of modern Gas Equipment for continuous, production-line heat processing. Compared with available fuels GAS is most readily controlled by simple automatic devices; Gas Equipment can be adapted for use with existing machinery or incorporated in new machinery without radical design changes, or expensive supplemental apparatus.

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. . . and 2/3 nickel. That gives me "oomph" (strong, tough and hard, to you). I'm much stronger than common brasses and bronzes.
SLICK & SMOOTH - THAT'S ME
See my glossy surface? It stays that way. I don't clog, either. Things just whiz through me.
MAYBE YOU CAN'T RESIST ME
but I'M resistant. Rust? Poof . . . I'm immune to it. Corrosion? High temperatures? Kid's stuff! Abrasion? Stress? I wear like . . . . MONEL!
IT'S A CINCH TO FORM & JOIN ME
Do I form easily? Say, I'm ductile. Any shape you like. What's more, I can be welded, brazed or soldered.
I COST LESS
than any corrosion-resisting wire cloth of equally high strength.

"Buffalo" Monel Wire Cloth is woven in a large range of meshes from very fine to coarse, in all standard weaves.

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Manufacturer of All Kinds of Wire Cloth Since 1869
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## PERSONALS

plant, its 42nd St. shops in New York City, and electronics shops in Allentown, Pa. **Joseph R. Bransford,** assistant personnel director, has been appointed to succeed Mr. Goetze.

• **William M. Buttriss** has been appointed advertising and sales promotion director, Tinnerman Products, Inc., Cleveland. Mr. Buttriss joined the company in 1934 and has since served as director of market research and development, and as assistant sales manager of the company.

• **Harold P. Wolf** has been appointed assistant manager of the commercial research department of Rheem Mfg. Co., New York. Prior to joining Rheem, Mr. Wolf was a consultant in the New York and Chicago offices of Booz, Allen & Hamilton, and before that was a research analyst for U. S. Steel Corp. of Delaware.

• **Francis M. Gunn,** assistant to the president, and **R. W. Higgins,** accounting consultant, Pullman-Standard Car Mfg. Co., Chicago, have retired after having been associated with the company since 1892.

• **Donald L. Nivling** has been made branch manager of Kaiser Aluminum Co.'s Boston office.

• **C. J. Leroux** has resigned as a director and vice-president in charge of sales of the Freedom-Valvoline Oil Co., Freedom, Pa. **Harry I. Johnston,** formerly manager of sales under Mr. Leroux and an employee of the Freedom Co. for 27 years, has been elected director and vice-president in charge of sales. **Harold J. Dunmire,** affiliated with the Valvoline and Freedom-Valvoline Oil Co. for 18 years, formerly in sales and later manager of the Butler plant, has been made manager of sales as assistant to Mr. Johnston.

• **Lawrence A. Franks** has been appointed manager of the Boston district office of the H. K. Porter Co., Inc. He formerly was with Bird & Sons, Inc., as a sales engineer and spent some time with the Metal Glass Products Co.

• **Lester Selig,** who started work with the General American Transportation Corp., Chicago, 33 years ago, has been elected chairman of the board. **Max Epstein,** who has been chairman, has been elected chairman of the executive commit-

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***THE UNION CHAIN AND MANUFACTURING CO.,*** Sandusky, Ohio, sprocket chain manufacturers, had difficulty keeping roller chain pin production in pace with the rest of the chain manufacturing operation. A bottle-neck lay in the end softening operation of the case hardened chain pins.

***E. B. Pedersen,*** Airco Technical Sales Representative, suggested oxyacetylene flame softening, and with Union Chain engineers, devised an automatic flame softening unit. An Airco 9903 torch with specially designed extensions was used. A No. 2 tip, placed about 1½" away from the 5/16" diameter pin, softens the cottered end to a depth of 3/16". A No. 1 tip, somewhat closer, softens the other end to a depth of 1/16". A subsequent operation skins the head on the softened end of the case hardened pin.

With the exception of feeding pins into the chute, the unit is completely automatic, depth of softness is accurately controlled, and pin production has increased 300%.

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## PERSONALS

tee. **John P. McFadden** has been made a director and vice-president of the company, to succeed **Bennett Epstein,** retired. Mr. McFadden has been with General American for 33 years. **Howard C. Westfall,** eastern manager for the tank, storage terminal division of the company, has been elected assistant secretary.

• **Creed W. Fulton** has been named vice-president of the Samuel J. Creswell Iron Works, Philadelphia. He had been with American Pulley Co. since 1942 as industrial engineer and later served as director of industrial relations until he joined the Samuel J. Creswell Iron Works in 1947.

• **Harold A. Dresser** has joined the Los Angeles sales department of the Marley Co., Inc.

• **R. W. Mueller** has been appointed manager of sales, stainless steel division, Tennessee Coal, Iron & R.R. Co., Birmingham. **C. M. McKenna** has been named manager of sales training and procedure for the company.

• **M. F. Noble** and **E. W. Gutgsell** have been appointed assistant sales managers of Fresh'nd-Aire Co., Chicago. Prior to joining Fresh'nd-Aire Mr. Noble was employed in the sales methods division of the Western Coca Cola Bottling Co. Mr. Gutgsell was associated with the Ox-Fibre Brush Co.

• **E. S. Ronk,** sales manager of Bowser, Inc., refrigeration division, Terryville, Conn., has been named general manager of the company, succeeding **M. J. Kennedy** who has accepted a position with the Renfrew Electric Co., Renfrew, Ont.

• **Henry J. Hart** has been appointed vice-president in charge of production of Royal Typewriter Co., Inc., New York. Mr. Hart joined Royal as a tool designer in 1917. He became factory superintendent in 1945 and factory manager in March 1948.

• **Wendell G. Fogg** has been appointed executive engineer of the Air Reduction Sales Co., New York. He joined Air Reduction in 1918, and in 1924 was made chief chemist, a position he held until his recent promotion.

• **Maurice Nicholls** has been named director of foreign assembly operations for Kaiser-Frazer Export Corp., Willow Run, Mich. Mr. Nich-

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

# "Hearing is Believing"

## THAT AMERICAN PHILLIPS SCREWS

## *Cut Costs···Kite Sales*

**...when you listen to makers of Electronic Products like these:**

**HOW THEY CUT COSTS:** Says one hearing-aid manufacturer, "American Phillips Screws save us as much as 50% in time alone — and what they've saved us by banishing spoilage runs into even *more* money!" Simply because American Phillips Screws can't slip, can't slash, *can't drive any way but straight*. And because they're so much easier to handle, aim, and drive . . . without "dropsy."

**HOW THEY KITE SALES:** American Phillips Screws give all types of products a smart new look . . . a strikingly improved appearance over ugly, burred, slotted screws. And when you really *merchandise* their better holding power and greater vibration-resistance —which add up to fewer servicing needs — you've got an earful that drives home more sales. Find out what American Phillips Screws can do for *your* product. Write.

**AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND**

*Chicago 11:* 589 E. Illinois St. *Detroit 2:* 502 Stephenson Building

# AMERICAN PHILLIPS *Screws*

**ALL TYPES**

**ALL METALS:** Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

**Q: How Can You**

- *shorten or eliminate sizing and finishing operations?*
- *detect impending dimensional errors before they occur?*
- *sharpen cutting tools to get more consistent production?*
- *check surface roughness at the machine, in definite microinch units?*
- *save time and money on production jobs where successive sizing and finishing operations are required?*

**A: Simply by using the Profilometer in your production department!**

This simple, rugged shop instrument will measure the roughness of practically all machined or finished surfaces, directly in microinch units. The relationship of surface roughness to other gaging and control problems is such that, during the past ten years, the Profilometer has become a primary tool in quality control in leading plants throughout the country.

*DETAILED ANSWERS to the above questions will be found in this illustrated bulletin, together with other facts of direct concern to production and quality control men. Write for a copy — and arrange to have the Profilometer demonstrated in your own plant. You may be surprised to learn how this instrument can cut your production time and costs.*

The PROFILOMETER
TRADE NAME REGISTERED

PRC PHYSICISTS RESEARCH COMPANY

ANN ARBOR • MICHIGAN


## PERSONALS

olls was formerly chief consulting engineer for Kaiser shipyards.

• **Ralph D. Brizzolara** and **James Suttie,** vice-presidents of American Steel Foundries and **Joseph B. Lanterman,** comptroller, have been elected directors of General Steel Castings Corp., Eddystone, Pa., replacing Thomas Drever, president, and Charles L. Heater and Charles C. Jarchow, vice-presidents of American Steel Foundries.

• **Charles E. Acker** and **John D. Tyson,** vice-presidents of the Baldwin Locomotive Works, have been elected directors of General Steel Castings, replacing Charles E. Brinley, chairman of the board, and Ralph Kelly, president, of the Baldwin Locomotive Works, respectively.

• **F. Lowell Garrison,** formerly in charge of the San Francisco office of the General Electric Co.'s general news bureau, has been named radio sales manager for the San Francisco district of the company. **Robert W. Jackson** succeeds Mr. Garrison in the news bureau office.

• **John A. Slenker** has been appointed general superintendent of the Duluth, Minn., works of American Steel & Wire Co., Cleveland, succeeding **F. J. Martin,** deceased. Mr. Slenker joined the American Steel & Wire Co. in 1935, and since 1945 he has been assistant general superintendent at Duluth.

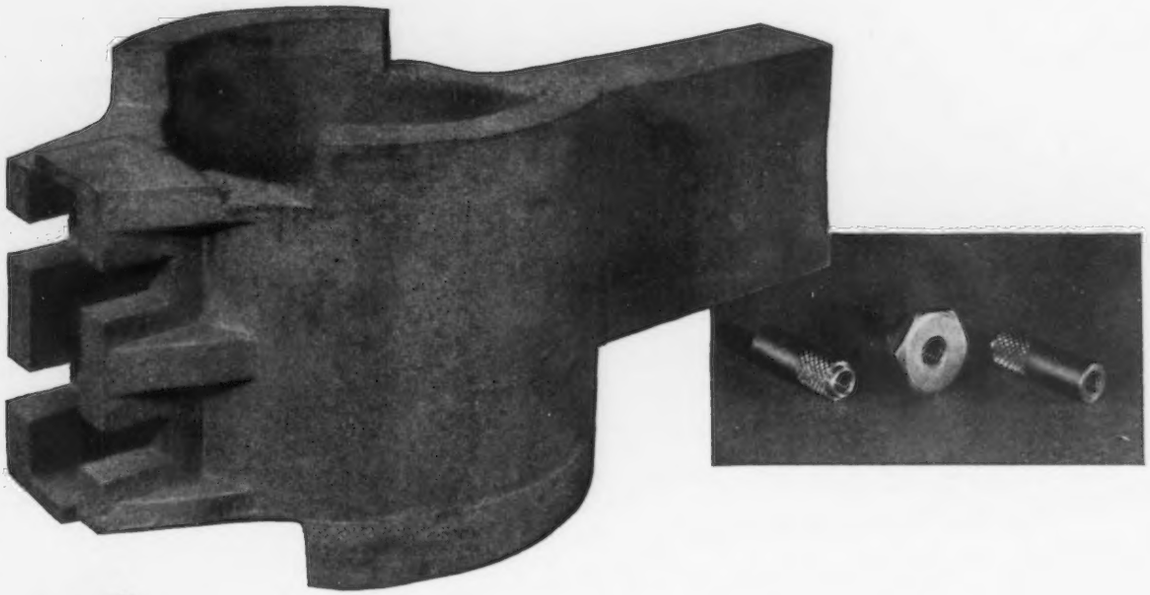
• **Carl E. Brock, Jr.,** has been appointed branch manager at the St. Louis office of the Ilg Electric Ventilating Co. He has served a 2-year apprenticeship with Ilg in the Pittsburg office. **H. L. Branigin,** former branch manager at St. Louis, has retired after serving the company for over 25 years.

● **Frederick W. Meuschke** has been appointed assistant sales promotion manager of Monsanto Chemical Co.'s plastics division, Springfield, Mass. Mr. Meuschke has been advertising manager of the Rumford Chemical Works for the past 3 years.

• **Bert E. Dwyer** has been appointed office manager of Bethlehem Pacific Coast Steel Corp., San Francisco.

• **A. S. Rairden** has been appointed wire rope sales manager for the Colorado Fuel & Iron Corp., its subsidiaries and divisions. He joined the Wickwire Spencer Steel Div. in 1933 as wire rope sales engineer and became wire rope sales manager of Wickwire Spencer Steel Co.

# Providing High Electrical Conductivity in Massive Castings or Typical Hardware



## Mallory Standard Copper Alloys
### answer many "special" requirements

THE 1,500 pound Mallory casting, used as the electrode clamp for the carbons in an electric arc melting furnace, and the typical electrical hardware shown here are both made from standard Mallory copper-base alloys.

Mallory research and development have made possible a series of precipitation hardening copper-base alloys—alloys that will meet the most exacting requirements where it is necessary to combine high strength and high electrical conductivity.

Mallory engineers will be glad to consult with you on your casting or part design.

***Many "Special" Metals are Standard at Mallory***

**P. R. MALLORY & CO., INC. INDIANAPOLIS 6, INDIANA**

***Do You Have a Copy?***

The Mallory Metals and Alloys Booklet is free to engineers who request it on their company letterhead.

***The following foundries are licensed to supply Mallory alloys:***

**City Pattern Foundry and Machine Co.**
**1161 Harper Ave. at Rivard St.**
**Detroit, Michigan**

**Cleveland Aluminum Casting Co.**
**901 Addison Road**
**Cleveland 3, Ohio**

**Commerce Pattern Foundry & Machine Co.**
**7450 Melville Ave.**
**Detroit 17, Michigan**

**Non-Ferrous Foundries, Inc.**
**2205 N. Sherman Drive**
**Indianapolis, Indiana**

**Philadelphia Bronze & Brass Corp.**
**22nd and Master Streets**
**Philadelphia, Pennsylvania**

**Railway & Industrial Engineering Co.**
**Greensburg, Pennsylvania**

P. R. MALLORY & CO. Inc.

**MALLORY**

HIGH STRENGTH, HIGH CONDUCTIVITY BRONZE BARS, STRIPS, FORGINGS AND CASTINGS—ELECTRONIC CORES—SPECIAL DEOXIDIZERS AND PURIFIERS—TUNGSTEN AND MOLYBDENUM SHEET, STRIP, ROD AND FABRICATED PARTS—SPARK PLUG ELECTRODES—HIGH DENSITY METALS—RARE METALS

**SPECIAL METALLURGICAL PRODUCTS**

SHEPARD
Newton's Law
Still Holds Good
Gravitation doesn't appear as a plant expense but it's a big factor in keeping costs up. Not even a feather will raise itself into working position, move sideways or deposit itself where needed. Human or steel muscles are needed to lift and move raw materials, semi-finished goods and finished products.
Where heavy loads are concerned, plant engineers don't depend on human muscles, but think in terms of a Shepard Niles overhead traveling crane. With a multitude of sizes and types available, there's bound to be one to fit your own needs — and a trained, experienced engineer of America's leading builder of overhead traveling cranes will help you select the one best fitted for your needs.
No matter what size or style Shepard Niles overhead traveling crane is selected to do your job, you can depend on sound design, rugged and precise construction, reserve capacity and economical, trouble-free operation year after year.
★ Shepard Niles engineers may feel an electric hoist is better fitted for your needs than an overhead traveling crane. Their recommendations are unbiased because Shepard Niles makes both. Only the type crane or hoist best suited for your job will be recommended.
Shepard-Niles
CRANE & HOIST CORPORATION
356 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.



prior to its merger with the Colorado Fuel & Iron Corp. He will continue to operate from Palmer, Mass. **E. L. Klinger** has been appointed wire rope sales engineer for CF&I. In his new capacity he will continue supervision of expanded sales engineering force in addition to acting as assistant to Mr. Rairden.

• **Lester M. Curtiss,** who has been general manager, steel plants, of Lukens Steel Co., Coatesville, Pa., has been named general works manager of the company and its divisions, By-Products Steel Co. and Lukenweld. Mr. Curtiss has been with Lukens Steel since 1919.

• **L. V. Johnson** has been named assistant chief engineer of National Tube Co., Pittsburgh. He has held various operating and engineering positions with National Tube and was formerly general superintendent of the Christy Park Works, McKeesport, Pa. Recently he has been chief project engineer in charge of the company's extensive modernization and improvement program at Gary, Ind.

## Obituaries

• **Peter D. White,** 59, recently elected president of the Babcock & Wilcox Tube Co., New York, died May 6. He had been with the Babcock & Wilcox organization 33 years.

• **John S. Coulton,** 68, vice-president and a director of W. S. Tyler Co., Cleveland, died May 9.

• **Perry N. Ellis,** 60, vice-president of Avondale Marine Ways, Inc., Westwego, La., died recently.

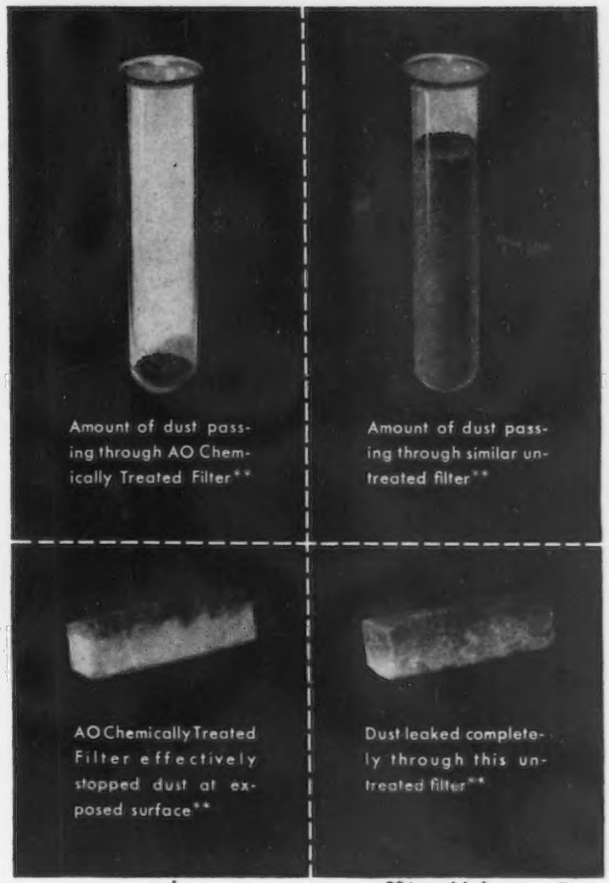
• **Daniel W. Lathrop,** director and former vice-president in charge of sales of Atlas Steels Ltd., Welland, Canada, died Apr. 21.

• **Edward W. Noel,** 57, associated with the New England Coal & Coke Co. for 35 years, recently as a superintendent, died Apr. 24.

• **James P. Begley,** 62, chief metallurgist and works manager of the Pratt & Letchworth Co., Buffalo, died Apr. 26.

• **Ralph N. Harwick,** 59, president of Harwick Engineers, Inc., during the 1930s in Buffalo, and a former branch manager for the Goodyear Tire & Rubber Co. in Duluth, died Apr. 22.

# Acclaimed as One of the Greatest Advances in Respiratory Protection in Years . . . the Proof . . . More and More Repeat Orders!


Amount of dust passing through AO Chemically Treated Filter**
Amount of dust passing through similar untreated filter**
AO Chemically Treated Filter effectively stopped dust at exposed surface**
Dust leaked completely through this untreated filter**

**Actual Laboratory Tests

## New AO* R-2000 RESPIRATOR with Chemically Treated Filter

It is easy to understand the popularity of this new AO Respirator because *each of its advantages leads to another!* Chemical treatment of the filter provides far greater filter efficiency, hence a far smaller filter (only five inches approximately) is possible. Therefore, a smaller filter container can be used which results in greatly superior wearer comfort and improved front and side vision.

There is no increase in low breathing resistance despite the vastly increased filtering efficiency. Filter is disposable and equipped with a gauze pre-filter which adds to filter life by barring larger particles of foreign matter—an economy feature. The new AO R-18 Plastic Face Shield, light in weight, durable and easy to attach is designed for use with the respirator and protects eyes and upper face against flying particles. Your AO Safety Representative can supply you with this great advance in respiratory protection.

*Approved by the Bureau of Mines.

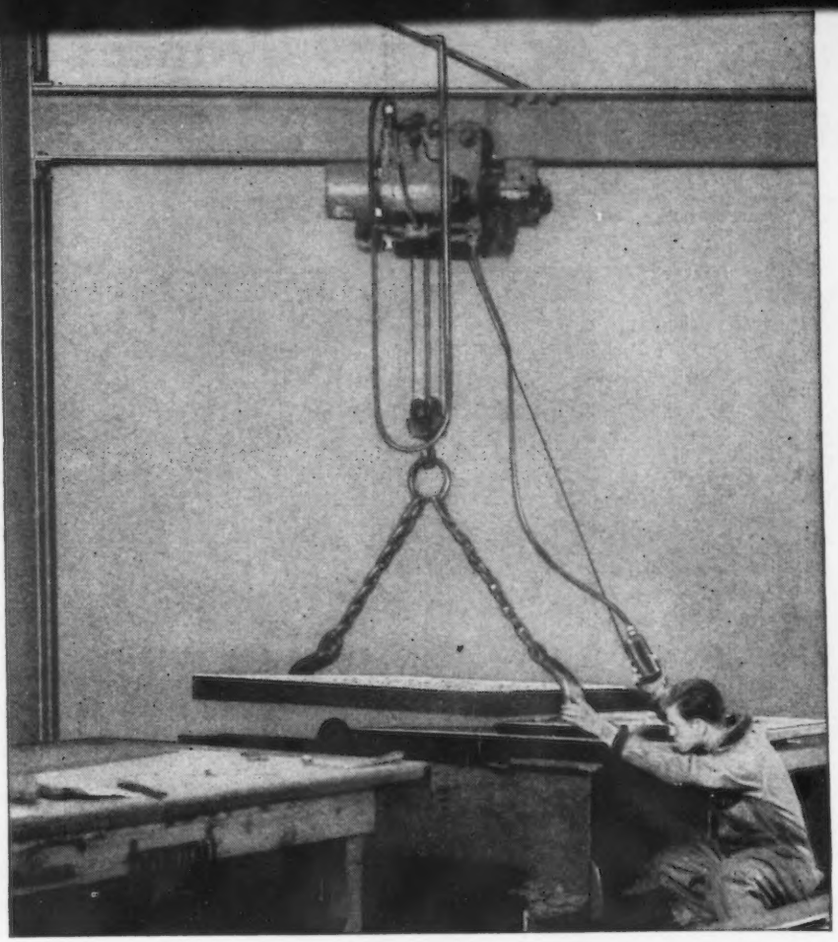
### *Read these Dramatic FEATURES!*

- Protects against dusts 24 millionths of an inch in diameter
- Filter does the job of similar untreated filters 8 times as large
- Chemical treatment of this filter increased its efficiency over 40 times
- Protects against a combination of dusts—toxic, nuisance and pneumoconiosis-producing

American Optical COMPANY

*Safety Division*

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



## Cut Costs Where Costs Start

**Slab cutting needs faster, more accurate material handling to save time cost. A NORTHERN ELECTRIC HI-LIFT HOIST will help an operator to load, cut, unload slabs quickly and accurately—save time and avoid delays.**

★ Let us send you Bulletin 121-H ★

OVERHEAD ★ ELECTRIC CRANES ★ AND HOISTS ★

NORTHERN ENGINEERING WORKS
2615 Atwater St., Detroit 7, Mich.



## Hardenability Specifications

(Concluded from p. 77)

same in service as the alloy steels already in use.

It is not a simple task, however, to select an ideal steel or an ideal hardenability for any given type of service, even if the service stress is known. Unfortunately, it is not always easy to determine stresses produced by all types of service.

At the present time there is a difference of opinion with regard to what constitutes the ideal combination of hardness, toughness, and other properties for certain types of finished parts, such as gears, and shafts, for example. Nevertheless, each manufacturer of such parts, through a gradual evolution, has worked out a combination of design, material, type of heat treatment and resulting physical properties and residual stresses, which have made finished parts that are satisfactory.

Different manufacturers, however, have arrived at such satisfactory performance by devious paths. Some favor a high surface hardness and a low center hardness, while others favor a more moderate and uniform hardness over the cross-section of similar parts.

Under these conditions it is impossible to state what is the ideal hardenability for any given type of part or service.

It is believed that the surface has merely been scratched so far as the use of hardenability studies is concerned, and that future studies along this line, along with further studies of both residual stresses and stresses produced in service, will lead to a more accurate knowledge of the type of steel most reliable and most economical for each type of service.

It is further believed that when it becomes common practice to make hardenability tests both as-quenched and as-tempered on all incoming heats of steel, and to correlate the results of such tests with performance in the heat treat, it will be possible to obtain better control over heat treating and reduce the number of changes of the details of the process in order to produce prescribed results. A comparison of the as-quenched Jominy test bar with as-quenched hardnesses obtained on finished parts as suggested by Boegehold[7] should establish the speed of quench produced by any particular production equipment. Tempered Jominy test bars

## . . . to suit your every need!

Do you make rivets . . . other cold-headed products? Do you need quality copper-alloy wire to be headed, extruded, drilled, or redrawn? Do you need wire of a certain degree of hardness, malleability?

Have you read the headline of this ad? Then you know the answer!

Come to Chase. Chase service, Chase quality . . . is just what you've been looking for. The word quality here means many things . . . freedom from physical defects . . . uniformity of surface texture and color . . . accuracy of dimensions . . . precise adjustment of temper and control of grain size.

Come to the nation's headquarters for brass and copper. Call your nearest Chase Warehouse or Service Office today!

# Chase

*the Nation's Headquarters for*
**BRASS & COPPER**

WATERBURY 91, CONNECTICUT

SUBSIDIARY OF KENNECOTT COPPER CORPORATION

THIS IS THE CHASE NETWORK . . . *handiest way to buy brass*

ALBANY† ATLANTA BALTIMORE BOSTON CHICAGO CINCINNATI CLEVELAND DETROIT HOUSTON† INDIANAPOLIS KANSAS CITY, MO. LOS ANGELES MILWAUKEE MINNEAPOLIS NEWARK NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH PROVIDENCE ROCHESTER† SAN FRANCISCO SEATTLE ST. LOUIS WATERBURY (†Indicates Sales Office Only)

# HIGH SPEED SNAGGING

Get the contracts. Figure closer. But do it on the preparation end—not on the precision end. You'll find Electro HIGH SPEED GRINDING WHEELS a tremendous help in meeting both price and delivery competition. They're faster, safer, and turn out a cleaner job on any metal whether working from swing frames, floor stands or in portable machines. Learn why. Send today for our Grinding Wheel Manual 645 in full color. It's free.

*Service from Los Angeles or Buffalo*

Electro SINCE 1919

MANUFACTURERS of REFRACTORIES High-Speed GRINDING WHEELS CRUCIBLES ALLOYS High-Temperature CEMENTS

**Electro REFRACTORIES & ALLOYS CORP.**

344 DELAWARE AVE. (Est. 1919) BUFFALO 2, N. Y.

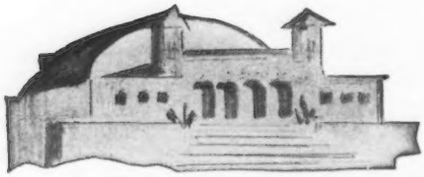
K-326A

## ATLANTIC CITY *by-the-sea*

**June 28 to July 1**

# INDUSTRIAL FINISHING EXPOSITION

A comprehensive exhibit of equipment and supplies for manual and automatic electroplating, polishing and buffing, cleaning and degreasing, tumbling and burnishing, enameling and lacquering, and allied processes. Of interest and value to all manufacturers concerned with metal surface treatment.



Make plans now to attend the Exposition and the A.E.S. Annual Convention and Technical Sessions. Exposition in Atlantic City's Convention Hall; Convention Headquarters in Ambassador Hotel. Sponsored by the A.E.S. Newark Branch.

***For further information, write***

**AMERICAN ELECTROPLATERS' SOCIETY**

**National Office, P. O. Box 168, Jenkintown, Pa.**

*Convention and Exposition Committee*

**35 Fourth Street, Newark 7, N. J.**




should aid in setting drawing temperatures.


**References**

1 Burns, Moore, and Archer, "Quantitative Hardenability." Trans. ASM, vol. 26, 1938.
2 Crafts and Lamont, "The Izod Impact Strength of Heat Treated Alloy Steel," Metals Tech., T.P. 2134, vol. 14, No. 2, February 1947.
3 "Hardenability Data Reports," May 19, 1944 and August 1945, AIS-SAE Hardenability Data Committee.
4 Field, "Calculation of End Quench Hardenability from Chemical Composition," Metal Progress, March 1943.
5 Crafts and Lamont, "Addition Method for Calculating Rockwell C Hardwell of the Jominy Hardenability Test," Trans. AIME, vol. 167, 1946.
6 Hodge and Orehoski, "Relationship Between Hardenability and Percentage of Martensite in Some Low Alloy Steels," Trans. AIME, vol. 167, 1946.
7 Boegehold, "Selection of Automotive Steel on the Basis of Hardenability," SAE Journal, October 1944. (Reprinted in "Hardenability of Alloy Steels," SAE-AISI Contributions to the Metallurgy of Steel—No. 11, June 1947).
8 Bain "Functions of the Alloying Elements in Steel."
9 Grafts and Lamont, "Effect of Alloys in Steel on Resistance to Tempering," Metals Tech., T.P. 2036, September 1946.


## *Reorganized RFC Faces Budget of $1.5 Billion*

*Washington*

• • • **The Reconstruction Finance** Corp., streamlined and rejuvenated by Congress, will start the new fiscal year with its lending kitty cut from a 1947 high of $18.9 billion to a new low of $1.5 billion.

Last year, Congress granted the 15-year-old loan agency a one year extension, during which time lawmakers of both houses took a close look at RFC and finally concluded that its huge capitalization could no longer be justified in times of relative prosperity.

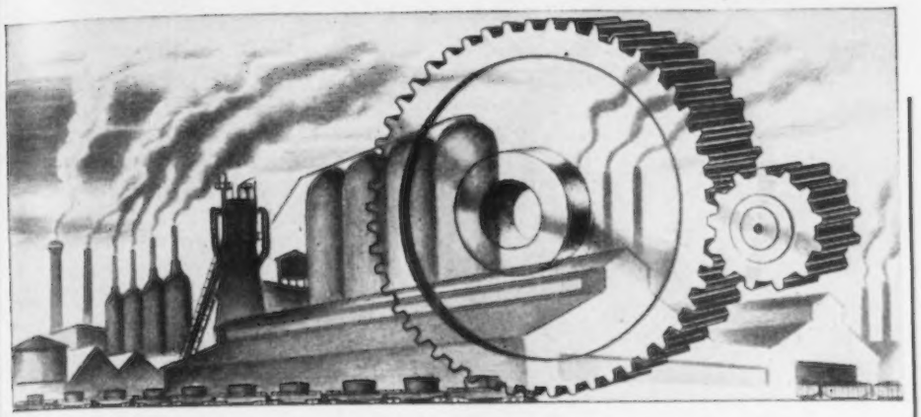
RFC, now shorn of its enormous wartime powers, is assured of a restricted existence for six more years, with an additional two years allowed for liquidation of its activities. Its capital stock has been cut to $100 million and its lending authority to make loans to industry, banks, insurance companies and small business reduced to $1,500 million.

Chairman Wolcott, R., Mich., of the House Banking Committee, explains the congressional examination of RFC this way: "RFC has played an important role in helping to meet the problems of the economic depression and in the production and procurement problems of preparing for and engaging in the war.

The new legislation under which RFC operates authorizes the agency to buy the preferred stock of insurance companies. But Congress declares its intent to take RFC out of the banking business.

"Banks have enjoyed a considerable period of prosperity and

# IT TOOK A LARGE STEEL PLANT to tell us how GOOD LEADOLENE *Klingfast* really is!



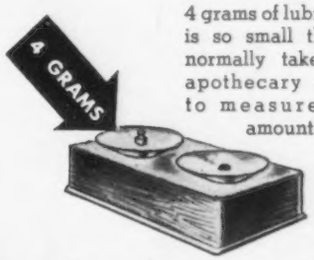
For many years it has been customary to use the Timken test machine to determine the breakdown point of lubrication. Recently a large steel plant decided that this was not a sufficient test to determine the safety point and went a step further as described in the text of this advertisement.

Normally the hardened and ground steel block and cup shown at the left is under constant lubrication during the Timken test and is fairly indicative of true operating conditions for bearings. However, this is not true for the lubrication of open gears. In the latter instance the applications are always of intermittent nature with the result that the application or film applied has to serve a rather long period of time before renewal is made.

This condition also exists with sleeve bearings where applications were intermittent, the bearings usually being of babbitt, bronze and cast iron.

To accomplish this condition on the Timken testing machine, the pump or flow of oil was shut off and an application of 4 grams of lubricant placed on a cup and block.

The machine was then set in operation and was watched closely until the block began to show signs of scoring as illustrated in the top line of the chart. So long as a project line appeared as is shown in the lower half of the chart, the lubricant was performing satisfactorily. In conducting this test no unusual methods were used . . . 4 grams of the lubricant under test were applied to the exterior surface of the block and cup—at room temperature. To our knowledge and to the steel company who made this original test, it is the only method that is a satisfactory answer to the lubrication of open gears in service—a lubricant that will stay on the gears and lubricate for the greatest length of time without failure.




4 grams of lubricant is so small that it normally takes an apothecary scale to measure the amount.

At the right we show the actual laboratory results of the comparative 4 gram test with competitive products.

The lubricants tested in comparison to Klingfast are all considered of quality nature and are used for open gear lubrication in general industry but particularly so in the severe service of steel plants.

Because open gears are lubricated periodically and not constantly, the pH-ilm must have lasting or enduring characteristics. Thus, the 4 gram test is truly representative of actual field operation tests for open gears. This enduring action together with extremely high pH-ilm strength guarantee the machine actual lubrication and protection.

***We will gladly send you a generous sample on request.***

## RESULTS OF 4 GRAM *Klingfast* LEADOLENE TEST

**30 MINUTES**
without scoring or failing.

### LUBRICANT "A"

**5 MINUTES**
A high grade compound scored at 5 minutes and failed in 12 minutes.

### LUBRICANT "B"

**8 MINUTES**
A reputable lubricant of residual nature scored and failed in 8 minutes.

### LUBRICANT "C"

**6 MINUTES**
A good lead compounded extreme pressure grease lubricant for open gears and general grease lubricant scored and failed in 6 minutes.

### LUBRICANT "D"

**6 MINUTES**
A well-known lead compounded pressure grease lubricant for open gears and pressure lubricating systems scored and failed in 6 minutes.

*LEADOLENE—the "L P. Lubricant" (Indestructible pH-ilm) . . . for industrial needs.

The Brooks Oil Co.

Pittsburgh 19, Pennsylvania
Cleveland, Ohio
Hamilton, Ontario
Warehouses: In Principal Industrial Cities

Here's Your GUIDE to Future CRANE & HOIST Purchases

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STREET No.....

.....TITLE.....

.....STATE.....

PLEASE SEND CATALOGS AS CHECKED

CRANES ☐ (Check) HOISTS ☐

● It's a simple matter to open this catalog and put your finger on the Euclid Crane that will meet your requirements.

The type of hoist best suited to your needs — the most economical capacity — how to install and the type of control most satisfactory for you are explained in the Hoist Catalog.

*Clip the coupon to your letterhead and mail to us* TODAY.

**THE EUCLID CRANE & HOIST CO.**

1361 CHARDON ROAD • EUCLID, OHIO

EUCLID CRANES AND HOISTS Raise Profits



**ARMSTRONG** *Drop Forged* **LATHE DOGS**

ARMSTRONG Lathe Dogs give extra service because they are drop forged from selected open hearth steel, and are heat treated to extreme toughness and stiffness. Hubs are made large enough to permit re-tapping, screws are also of special analysis steel and are hardened at the point to prevent upsetting. ARMSTRONG Dogs come in 10 types with square head of safety headless screws, with straight or bent tails. They are carried in stock by your local ARMSTRONG Distributor.

**ARMSTRONG BROS. TOOL CO.**

**5209 West Armstrong Ave., Chicago 30, Ill.**

**San Francisco and New York**




managements of banks, which have government capital in their business, should without delay take the necessary steps to raise funds to substitute private investment for government capital in their institutions."

In the field of nonlending activities, RFC has extended its influence to almost every industry since former President Hoover in 1932 asked Congress for an emergency lending agency solely to buttress weak banking institutions.

Ten years later RFC had built and was operating the $6.6 million Texas City tin smelter and in 1947 had realized more than $200 million from the sale of 377,343,000 pounds of tin.

In the field of synthetic rubber, RFC financed construction of some 51 plants and related facilities at a total cost of another $6.6 million. These plants were producing at the rate of more than one million tons of synthetic rubber annually by the close of 1945. Approximately 6.5 billion pounds of synthetic rubber have now been produced. The President has until 1950 to make recommendations to Congress regarding disposition of synthetic producing facilities.

Purchases of critical materials for stockpiling totalled nearly $10 billion up to June 30, 1947, RFC reported to Congress. But sales accounted for all but a small reserve of this expenditure. More than 50 categories of strategic and critical minerals and metals were bought in 38 states and territories and from 51 foreign countries.

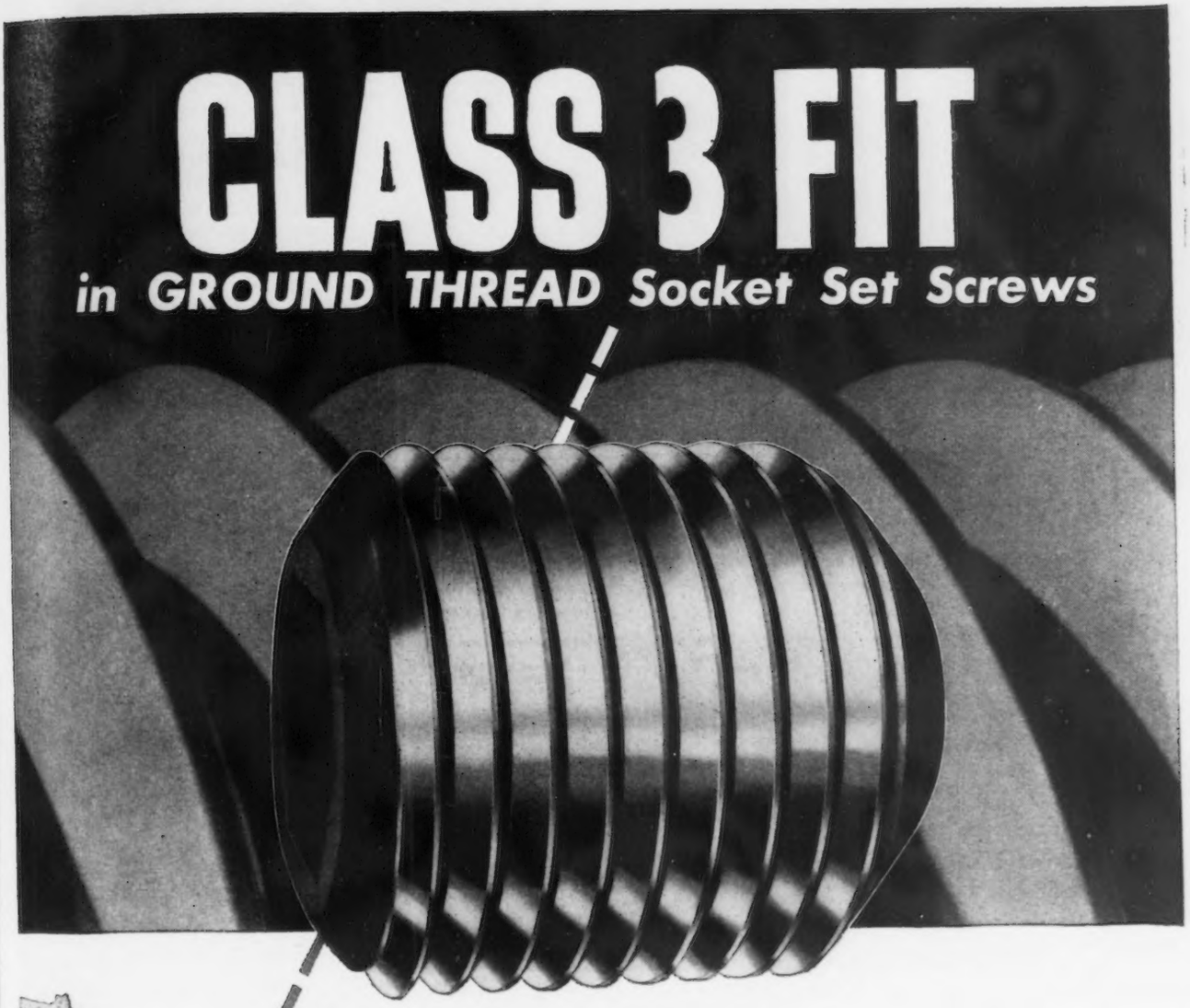
The agency also constructed or equipped more than 2000 industrial plants for use in war production, 62 flying schools and 150 other facilities essential to the war effort at an expense of $7.8 billion. These plants were leased to private industry for the manufacture of war material and supplies, with the exception of the synthetic rubber plants, the Texas tin smelter, the magnesium and aluminum facilities and a few others.

These installations included facilities to produce aircraft, engines and parts, aviation gasoline, chemicals, machine tools, guns, tanks, shells, bombs and other ordnance, ships and parts, steel and pig iron, industrial machinery, medical supplies, and other facilities. It has been estimated that these represent more than 10 pct of the value of the entire production facilities of the country.

# You're O.K. with P-K for Dependable

# CLASS 3 FIT

## in GROUND THREAD Socket Set Screws



**THE COMPARATOR,** used in inspecting every lot of P-K Ground Thread Socket Set Screws, clearly shows why you can be sure of uniform, dependable Class 3 Fit. Threads are ground on hardened blanks, by the first successful quantity production thread grinding process, with many advantages offered first in Socket Set Screws by Parker-Kalon.

Free from hardening distortion, mirror smooth, they have none of the nicks, burrs and other imperfections common to cut threads.

**SEE AND FEEL THE DIFFERENCE!** Ask for samples. See why P-K Ground Thread Socket Set Screws are years ahead by every test . . . why they'll put your product out in front — assembly-wise and sales-wise. Parker-Kalon Corp., 200 Varick St., New York 14.

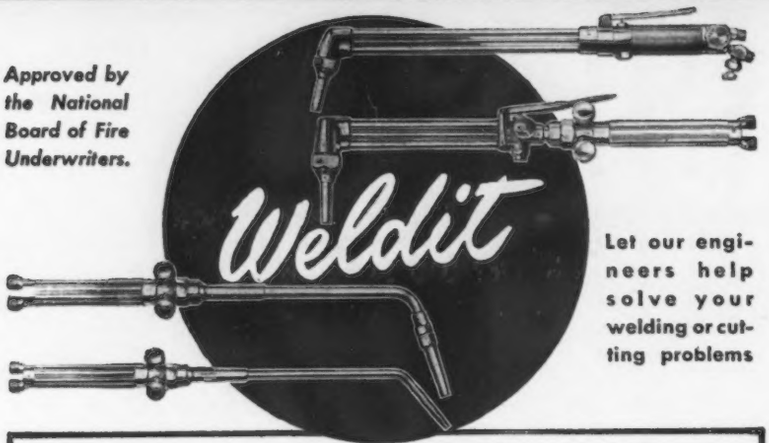
Available for Prompt Delivery

**PARKER-KALON** COLD-FORGED **SOCKET SCREWS**

SOLD ONLY BY ACCREDITED DISTRIBUTORS

# BUILT FOR ECONOMICAL OPERATION
## And We Can Prove It!

*Approved by the National Board of Fire Underwriters.*

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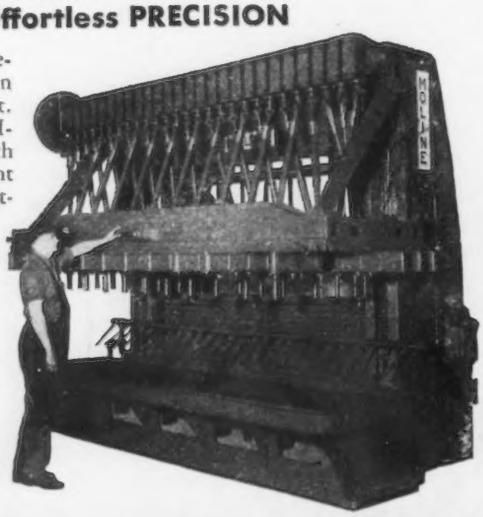
For your SPECIAL problem, go "Hole-Hog" and write us for any information you may need.




**No. HU68 DRILLER**

MOLINE TOOL CO. HOLE-HOG MOLINE, ILLINOIS

**MOLINE TOOL COMPANY**
100 20th Street Moline, Illinois




## *Describes Development Of a New Super-Speed X ray Motion Picture*

*Washington*

• • • **Development of super-speed** X ray motion pictures was recently disclosed to the American Physical Society in Washington.

"This X ray 'eye' can analyze the internal structure of rapidly moving objects and human organs," Dr. Charles M. Slack, director of research for the Westinghouse Lamp Div., said. Super-speed X ray movies, developed in the Westinghouse lamp research laboratories in Bloomfield, N. J., team up X ray exposures of 10 millionth of a second and a shutterless camera shooting movies at 100 frames a second.

"With exposures of such rapidity —2000 times faster than a person blinks—we are able for the first time to make X ray movies of speeding objects without blur," Dr. Slack reported to the Society's annual spring meeting.

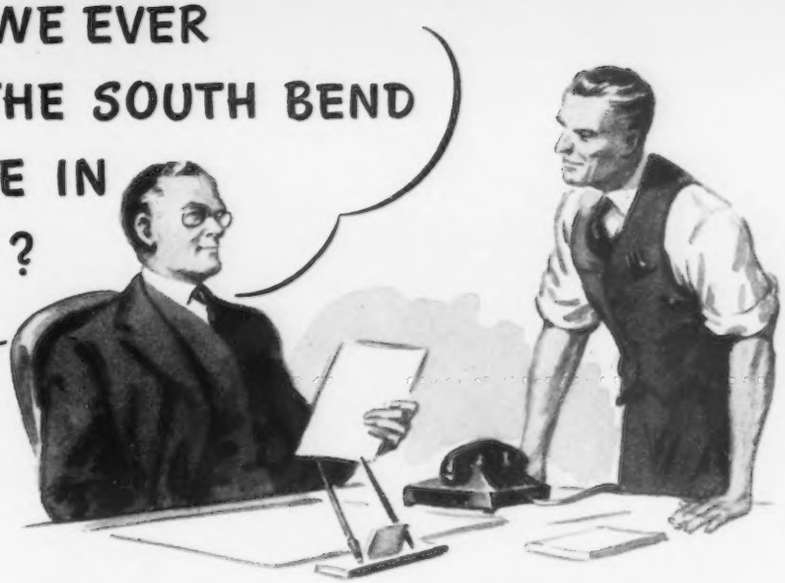
The X ray exposures, repeated at 1/100 sec intervals, are recorded on a continuously moving strip of regular movie film.

To illustrate the new technique, the Westinghouse scientist showed the physicists the "shortest short ever photographed," a 15-sec X ray movie sequence made by members of his staff. Their subject was a violent chemical reaction which took place in a crucible the size of a demitasse cup. Dr. Slack explained:

"The reaction pictured here actually took one second but we slowed it down for projection purposes. With this technique, rapid action which would be impossible to analyze at its normal speed can appear on the screen in comfortably-observed slow motion just as in an ordinary movie."

The reaction shown occurred when a mixture of iron oxide and aluminum, ingredients of wartime incendiaries, was ignited. The X rays, penetrating metal crucible walls lined with refractory material, revealed the actual melting phenomenon inside the crucible as well as the subsequent bursting of the molten metal through a steel plate underneath. A regular movie of the reation photographed in visible light, by contrast, showed merely a shower of sparks and molten metal gushing out the bottom of the crucible.

# JIM, HAVE WE EVER INVESTIGATED THE SOUTH BEND LATHE FOR USE IN OUR PLANT ?



This question has often been asked. Top men who are interested in production savings and efficiencies are discovering how South Bend precision *pays.* Especially in the machining of small close-tolerance parts is this a fact.

South Bend Lathes offer you a number of important advantages: speed of operation and ease of handling that make fast machining possible . . . precision to facilitate close-tolerance work . . . fine finishes that often eliminate subsequent operations. They give you everything you need to machine light, fast jobs efficiently. And, you will probably save on your capital investment, as well as labor costs. It will pay you to investigate South Bend Precision Lathes.

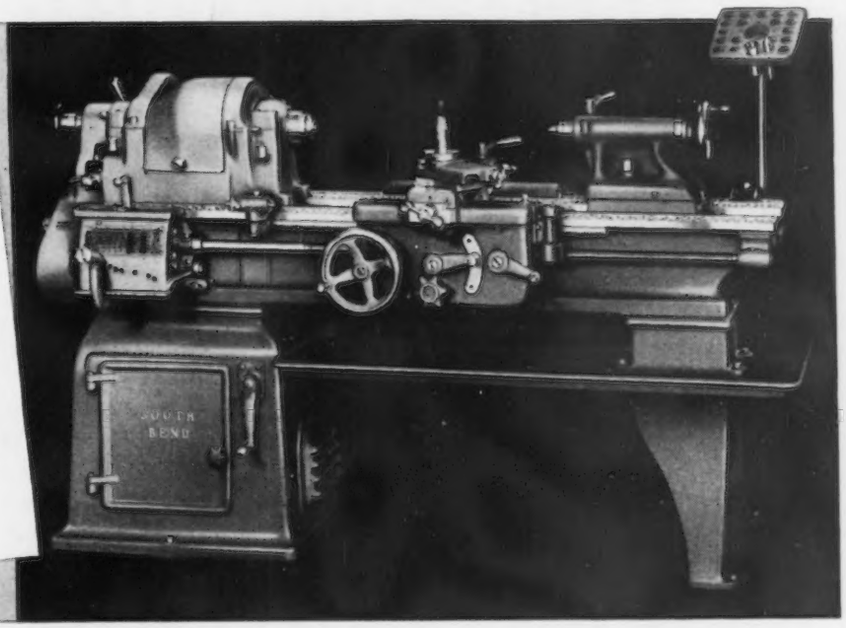
Call our local distributor. You will find his name under "Machine Tools" or "Lathes" in your classified phone book. Or, write for Catalog 100-G.

## SOUTH BEND LATHES

**PRICE LIST**

| Lathe Size | Quick Change Gear Model | Toolroom Model |
|---|---|---|
| 16" x 6' Lathe | $1640.50 | $2031.50 |
| 14-1/2" x 5' Lathe | 1382.50 | 1735.50 |
| 13" x 5' Lathe | 1153.50 | 1481.50 |
| 10" x 3' Lathe | 863.60 | 1151.60 |
| 9" x 3' Bench Lathe | 312.70 | 481.70 |

*Prices include 3 phase, 60 cycle, A.C. motor, and drum switch—f.o.b. factory.*



**16" X 6' TOOLROOM LATHE** with handwheel collet attachment; collet rack; taper attachment; micrometer carriage stop; chip pan; thread dial; 3 ph., 60 cy., 220 V. motor; and drum switch. Catalog No. 8117-C **$2031.50**

BUILDING BETTER TOOLS SINCE 1906

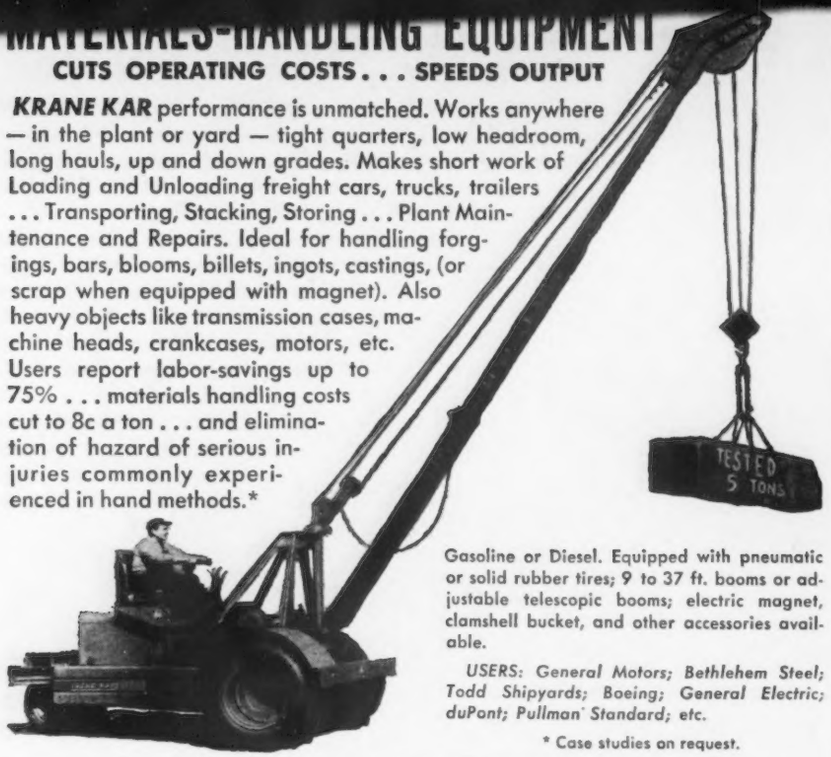
**SOUTH BEND LATHE WORKS**

421 EAST MADISON STREET, SOUTH BEND 22, INDIANA

MATERIALS-HANDLING EQUIPMENT

**CUTS OPERATING COSTS . . . SPEEDS OUTPUT**

***KRANE KAR*** performance is unmatched. Works anywhere — in the plant or yard — tight quarters, low headroom, long hauls, up and down grades. Makes short work of Loading and Unloading freight cars, trucks, trailers . . . Transporting, Stacking, Storing . . . Plant Maintenance and Repairs. Ideal for handling forgings, bars, blooms, billets, ingots, castings, (or scrap when equipped with magnet). Also heavy objects like transmission cases, machine heads, crankcases, motors, etc. Users report labor-savings up to 75% . . . materials handling costs cut to 8c a ton . . . and elimination of hazard of serious injuries commonly experienced in hand methods.*




Gasoline or Diesel. Equipped with pneumatic or solid rubber tires; 9 to 37 ft. booms or adjustable telescopic booms; electric magnet, clamshell bucket, and other accessories available.

*USERS: General Motors; Bethlehem Steel; Todd Shipyards; Boeing; General Electric; duPont; Pullman Standard; etc.*

* Case studies on request.

***KRANE KAR*** handles loads at Sides as well as at Front.

Ask for illustrated Bulletin No. 79.

THE ORIGINAL SWING-BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER

1¼, 2½, 5, AND 10 TON CAPACITIES

**KRANE KAR**

TRADE MARK REGISTERED

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# Won't SHAKE LOOSE!

(A) Pat'd & Pats. Pend.

(B) Pat'd & Pats. Pend.

(C) Pat'd & Pats. Pend.

**UNBRAKO SOCKET SCREW PRODUCTS**

Reg. U. S. Pat. Off.

(A) The *Knurled* and swaged Threads of this "Unbrako" Socket Head Stripper Bolt make it a SELF-LOCKER that positively *won't shake loose* — tests prove it! This very feature solved a serious loss of production problem in connection with a High Speed Die, on which originally *plain* stripper bolts kept shaking loose. If similarly afflicted, be sure to substitute "Unbrako" Self-Lockers.

(B) The Knurled Cup Point of the "Unbrako" Socket Set Screw makes it a SELF-LOCKER — because the knurls dig-in and stay-dug.

(C) The *Knurling* of this "Unbrako" Socket Set Screw, as shown, swages the threads, so it becomes a most excellent SELF-LOCKER, for use where points other than cup-point must be used. Get this — our patented "Unbrako" SELF-LOCKERS will prevent most any Set Screw application from working loose — so, write for detailed information contained in the "Unbrako" Catalog.

***Ask for the name and address of your nearest "Unbrako" Industrial Distributor.***

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## Refresher Course In Sales Engineering To Be Given At Cornell

*Cleveland*

• • • **Fifty-three students** representing sales and district managers and sales engineers in the machine tool building and distribution fields have been selected for the special summer refresher course in sales engineering to be held at Cornell University, Ithaca, N. Y., according to an announcement by National Machine Tool Builders' Assn.

The course will be conducted by Sibley School of Mechanical Engineering in cooperation with NMTBA and the American Machine Tool Distributors Assn. It is the first course offered by a college to emphasize the sale of capital equipment in American industry, and is part of the promotion program for the industry which has been planned for 1948 by NMTBA.

Subjects scheduled for discussion will include: man-machine charts, shop layout; and such broader aspects of the machine tool picture as foreign sales and the role of the sales engineer in industry.

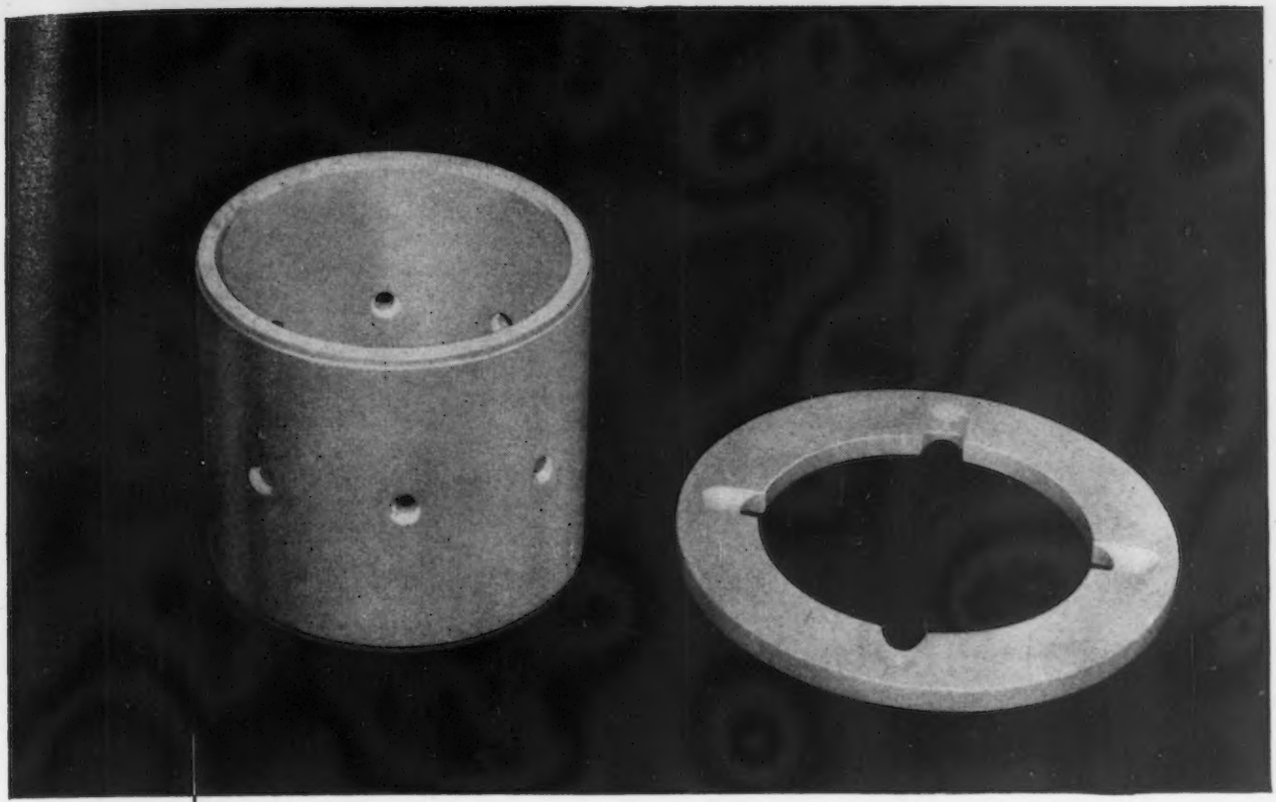
Other parts of the program will deal with the psychology of selling, case studies, specific sales procedures and the use of advertising in selling.

Faculty for the course will be made up of 43 persons including Cornell faculty members, sales executives from the machine tool industry and customers experienced in the purchase and application of machine tools.

National Machine Tool Builders' Association sales and service committee is comprised of the following: Daniel R. Weedon, chairman, assistant manager Blanchard Machine Co., Reed M. Andress, 2nd vice president in charge of sales, Barnes Drill Co., James C. Hebert, sales manager, Jones & Lamson Machine Co., J. Herbert Myers, vice president, machine tool sales, Lodge & Shipley Co., B. C. Saunders, secretary, Gallmeyer & Livingston Co., Herbert L. Tigges, executive vice president, Baker Brothers, Inc., ex-officio member, A. G. Bryant.

Staff of the NMTBA are: Tell Berna, general manager, Mrs. F. F. Selbert, secretary and Robert H. McGrath, assistant to the general manager.

Members of the American Machine Tool Distributors' Association sales and service committee are: Robert L. Giebel, chairman, president, R. L. Giebel, Inc, Frank L.



# Longer bearing life means extra dollars

***N-B-M Bearings prove their extra value in the mill — and in the accounting department***

The first cost of a bearing is almost always misleading — it's the first cost plus *service-life* that gives the final answer as to whether or not you are getting economical bearing service.

That's the approach taken by National Bearing Division: To make a complete engineering study and to design a bearing "tailor made" to your own service conditions. Only this approach is successful — in one case National Bearing Engineers designed a bronze bearing which lasted many times longer than the bearings formerly used.

The purpose of National Bearing research and manufacturing development is twofold:

1. **To design for the specific application, and**
2. **To maintain production standards which assure better bearings — bearings that make important dollar savings.**

Let National Bearing's specialized approach help you reduce bearing maintenance costs in your mill.

NBM

AMERICAN Brake Shoe COMPANY

**NATIONAL BEARING DIVISION**

ST. LOUIS • NEW YORK

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## Steel Exports Difficult

*London*

• • • **British iron and** steelmakers holding export allocations are finding that more and more of these allocations are being taken up by orders sponsored by one or other of the government departments.

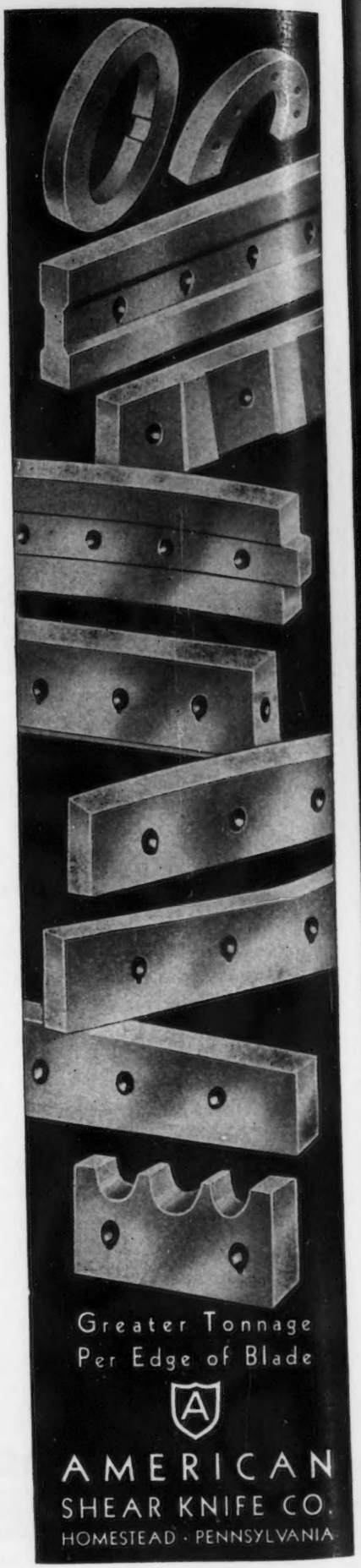
In practice manufacturers are given block tonnage under license which they can theoretically allocate among the customers on their books. Sponsored orders, however, must come first and the number of these has grown so steadily in recent months that few manufacturers have tonnage which they can distribute to ordinary customers. Many of these sponsored orders arise because of bilateral agreements.

Quite apart from this aspect export trade is not easy to carry out. Import license difficulties have to be overcome. Shipping companies will not load without an import license reference and makers are unwilling to roll until the license is granted. Customers abroad are still willing to take practically anything which is offered but foreign governments have become more discriminating, tending to insist that any tonnage of steel which comes in consists of products which best serve national interests or desires. An example is where insistence was laid on shipbuilding steel, import licenses for other products being refused.

## Nails Freed For Export

*Washington*

• • • **The Office** of International Trade, Dept. of Commerce, has announced that small quantities of galvanized needle point nails, not to exceed 2/3 lb, when packaged with each square of asbestos roofing, or an amount not to exceed 1-3/4 lb special alloy nails, when packaged with each square of siding, may be exported to any destination with the roofing or siding without additional specific license.



*Assembled Without Gasket*

**TO WITHSTAND 600 LB. PRESSURE**

Users of Mattison Grinders, having parts which must be assembled without gaskets, are getting results in accuracy and fine finish that eliminate the lapping operation in most cases. One example is the gate valve disc shown in the picture.

They are ground on a real production basis — 100% increase over previous method to a close degree of accuracy and are assembled without the use of gaskets to withstand pressures up to 600 lbs. There is no lapping operation. Material is Exelloy 325 Brinell.

This is only one example showing the capability of the Mattison Grinder. Further examples are shown in the Mattison Set-Up Book.

Write for Free Set-Up Book showing how others have reduced time and cut costs with Mattison Grinders.

**MATTISON MACHINE WORKS**

ROCKFORD · ILLINOIS

## Fuel Oil Shortage And Cost Increases Hurt Britain's Industries

*London*

• • • **In the 12 months** which have elapsed since the removal of the import duty, heavy oil prices in Britain have been advanced by 4.125¢ a gallon, or roughly $11 a ton. This increase, which reflects the trend of events on the world market, has thrown a heavy additional burden on industries that responded to officials exhortations to convert from coal to oil.

The rise in prices has been accompanied by difficulties of supply, and some industrialists who were previously enthusiastic about oil-firing are considering the advisability of reconverting to solid fuel.

British Iron and Steel Federation, in a survey of the position, points out that the aggregate increase in cost which has occurred since the end of August is equivalent to a rise of between 38 and 50 pct, depending on the zone and the quantity purchased. The Federation has converted a lot of furnaces to oil, and is gaining advantages in output, but the higher prices are causing concern. "If," says the Federation, "some industrial consumers are beginning to feel that they have backed the wrong horse, the conclusion is hardly surprising."

The Federation considers there is little prospect of a decline in the selling price of either fuel oil or coal during the next two or three years; indeed, there may be a tendency for prices to go still higher. In the case of oil, the duration of this transition period (during which the expansion of world production will continue to be hampered by shortage of refining and transport facilities) might be affected by developments in the United States; for in the unlikely event of a slump in that country the existing supply-demand relationship would drastically alter.

Looking further ahead, the seller's market in oil should gradually pass away in the early 1950's unless political disturbances in the Middle East frustrate the development plans for that area. Thereafter, fuel oil prices should enter upon a decline, the scope of which would appear to be considerably greater than in the case of coal.

*...when it's equipped with*

**FAIRFIELD GEARS**

There is no finer recommendation for the quality of the product you sell than to be able to say that it is "Equipped with FAIRFIELD GEARS!" Long producers of the gears needed in high grade trucks and tractors, Fairfield now brings the same standards for gear performance to a wide variety of products: Road Graders . . . Machine Tools . . . Diesel Engines . . . and a host of others. Fairfield makes all kinds of gears: spur . . . herringbone . . . spiral bevel . . . straight bevel . . . hypoid . . . zerol . . . worms and worm gears . . . splined shafts . . . differentials. Your inquiry will receive prompt attention.

FAIRFIELD MANUFACTURING COMPANY

305 So. Earl Ave. Lafayette, Indiana

For FINE GEARS


## Bureau of Mines Lets A Synthetic Fuel Plant Contract to Blaw-Knox

*Pittsburgh*

• • • **Chemical Plants Div.**, Blaw-Knox Co. has received a contract for engineering, procurement and erection services in the completion of a Fischer-Tropsch synthetic liquid fuels pilot plant at Bruceton, Pa., for the Bureau of Mines.

The pilot plant is part of the Bureau's program for development of information on liquid fuels from coal. The Bureau plans to process up to 7500 cu ft of synthesis gas per hr, from which it will produce up to 5 bbl per day of crude output at this plant.

In the Fischer-Tropsch process, also known as gas synthesis, a mixture of carbon monoxide and hydrogen is introduced into a catalytic reactor or converter. This mixture is known as synthesis gas and is normally stable, with the carbon monoxide and hydrogen showing no affinity for each other. But the catalyst brings about a reaction to produce a variety of hydrocarbons, alcohols and other oxygenated compounds. The synthesis gas used in the catalytic reaction can be produced from coal or natural gas by reaction with steam and/or oxygen.

The installation will emphasize the study of the synthesis step or catalytic reaction of the process.

Chemical Plants Div. of Blaw-Knox assisted in the basic design and engineering of equipment for the Bureau's coal hydrogenation pilot plant at Bruceton, another part of the Bureau's program in the development of synthetic liquid fuels.

At present, Pittsburgh Consolidation Coal Co. and Standard Oil Development Co. are building a pilot plant at Library, Pa., for the gasification phase of the Fischer-Tropsch process.

## U. S. Steel Releases Film

*Pittsburgh*

• • • **U. S. Steel's** new motion picture, "Unfinished Business," will soon be released to theatres throughout the country. The film, which had its premiere May 3 at the corporation's annual meeting of stockholders, describes from VJ-Day the progress of U. S. Steel's multi-million dollar construction program and also tells the story of its peacetime production.